The Journal
of the
Mysore Agricultural
and
Experimental Union.

VOL. III. DECEMBER 1921. No. 4

The Fourth Annual Meeting of the Mysore Agricultural and Experimental Union.

THE PRESIDENT'S OPENING SPEECH.

Gentlemen,—I have great pleasure in welcoming you to this the Fourth Annual Meeting of the Mysore Agricultural and Experimental Union. For the benefit of the newer members and for those present who are not members of our Union, I should like to tell you something of its short history. The proposal to form this Union did not come from me or from any of the senior members of the staff or from any of the older agriculturists among us. It came from a number of our younger men, both non-official and official, who felt that there should be a closer bond of union between the Agricultural Department on the one side and educated agriculturists on the other. They aimed especially to gain the co-operation of men trained in agriculture in our school and elsewhere who had returned to the land. These young men discussed the question with me in May 1917. I felt strongly that it would be of comparatively little use to organize an agricultural association unless we aimed at its performing some function which ordinary agricultural associations of which we have had many do not carry out. The fact that its membership was to be drawn largely from those who had had agricultural training and exclusively from educated agriculturists seemed to make this possible.

I need hardly point out to you the fact which I have repeatedly reiterated and which must have been impressed upon you by your own experience that, with the varied conditions of soil and climate existing in Mysore, it is impossible for us to say definitely that results obtained in any one of our four Experimental Farms will apply generally throughout the State. To obtain certainty on this point it is necessary to have our experiments repeated carefully under as many different conditions as possible. To carry out such tests seemed to me a function which the members of this Union should be able to perform. Thus while our Union has within its province all questions relating to the improvement of agriculture it has, as its special function, the carrying out of tests in co-operation with the Agricultural Department. I look forward to the time when we shall have members in every *taluk*, even in every *hobli* in the State, who will be carrying out such tests. When we reach that stage of development we shall see an astounding rapidity of progress in agricultural improvement. It will be long before we reach this goal but it is the goal to which we should strive.

If we turn to the progress made in the work of the Union during the past year, we shall find from our Secretary's report that the body of experimental work has greatly increased. I have been able to inspect some of this personally and find that many of the experiments are being carried out admirably. Most of the crops have yet to be harvested and I feel sure that members who have taken such pains in starting these experiments will show equal care in the harvesting and the preparation of the statistical records of results. Our membership is growing steadily but I wish to emphasize the fact that the strength of our Union cannot be measured by its size but by the way in which we, as individual members, carry out items of work which we promise to carry out. Unless we do this there is very little excuse for our existence as a separate organization.

During our last meeting it was agreed upon that the new model plough which had been sent out for test should be constructed of better material. This has since been done and a total of six such ploughs have been made. One of these has been given a preliminary trial by one of our members, Mr. H. Srinivasa Rao, and he will report the results of his trial at this meeting. You will moreover have the

opportunity of seeing one of these ploughs working at Hebbal on Wednesday.

According to a resolution passed at our last meeting arrangements were made for extensive trials of our tractor on various different types of soils in the State. After the main cultivation work on the Babbur Farm was completed, the Tractor was sent out for trial on a piece of typical black cotton soil in Hiriyur taluk. The report on the work done will be given by Mr. K. M. Gururaja Rao. Unfortunately our trials had to end here; for, just as the Tractor had been ordered to be sent to Mysore District for extensive trial on a red soil area in Gundlupet taluk, an important part of the differential gave way and the Tractor was out of commission. Spare parts were ordered at once but have only been recently received so that practically six months' time has been lost. It is obvious that, unless spares can be made more readily available, the prospects of Tractor cultivation in this part of India are not bright.

Two of the members of the Union who are at the same time members of the Departmental staff have been absent abroad for study during the whole year. Both of these have been very successful. One of these who left us as Mr. Kunhi Kannan over a year and a half ago has returned to us as Dr. Kunhi Kannan and will, I trust, be with us before the end of this meeting. The other, Mr. M. K. Venkata Rao has already obtained his diploma in Agriculture in Cambridge and his M. Sc. in the University of California. He will return to us next year after taking his Doctor's degree.

With regard to the staff of the Union during the year, it has been found possible through the kindness of the Government to appoint a full time secretary. The services of Mr. N. Venkatasubbayya of the Agricultural Department have been lent for this purpose and he is now devoting his full time to the work of the Union. It is hoped that this arrangement will materially improve our work and especially the promptitude, or shall I say lack of promptitude, with which our Journal is being issued.

My dual position as Director of Agriculture and President of the Union has led me to decide to take up a little of your time at this meeting in discussing questions related to the Depart ment's work. I do so because I feel you represent to a considerable

extent the best informed element among the agriculturists of the State and I think you should be fully conversant with what the Agricultural Department is doing and is attempting to do.

During the past year there has been a certain amount of criticism of the Mysore Agricultural Department and its work. This criticism has not appeared in the public press which I am glad to say has treated us in a very kindly manner. It has arisen in the two representative bodies in the State, the Representative Assembly and the Legislative Council. Criticism of the Department and its work is, I think, we all will agree, a good thing. It is a sign that we are alive. One does not trouble to kick a dead dog. Where criticism is honest and fair even though misinformed it is worthy of serious consideration and I propose to take a few minutes of your time in answering it. Before doing so, however, I should like to show you why such criticism is likely to be misinformed.

There are definite reasons why an Agricultural Department should not make so much noise in the world as some other departments of Government. In the first place its work in India especially during the earlier years of its existence consists largely in ascertaining what are and what are not practical improvements which can be introduced into the area which it serves and in introducing these improvements over a large area but on a comparatively small scale in any one locality. It is of course a question as to whether more concentrated effort in one district of Mysore would not lead to more tangible results than would extended effort over the whole State but I do not believe that the people of the State as a whole would view with equanimity such a policy. They would say quite rightly that an Agricultural Department is intended for the benefit of the whole State and not for any one district. In the second place, while the agriculturists among whom we work are undoubtedly the most important section of our population, they are at the same time the least vocal section. They are the backbone of the country but it is difficult to make a megaphone out of a vertebral column.

If the work of the Agricultural Department is to become widely known, it must therefore be largely through its own efforts and through the efforts of those intelligent agriculturists who are working most closely in association with it.

The Department itself from time to time publishes bulletins and circulars. It also issues annually a calendar which contains much information with regard to the work that is being done and many suggestions as to the work that can be done. These various publications have a circulation extending into several thousands. The Annual Report of the Department which contains a short account of the work done during the previous year reaches very few indeed and it is probably on this account that the reading public of the State are not better informed on what agricultural improvements have been and are being introduced into the State.

I believe I am right in presuming that the members of this Union and the subscribers to our Journal have a more accurate knowledge of our work than others in the State but it is possible that even they have not a very exact and definite idea of what has been accomplished. It is especially to these men that we should turn for assistance in making known to the people of the State what the Department stands for. It is my object to-day to furnish you with information which will enable you to do this.

The criticisms laid at our doors may be stated as follows :— Firstly, the Agricultural Department through its District Staff is not reaching and influencing the agriculturists of the State in any considerable numbers and secondly, the Department is not giving to the agriculturists of the State services at all commensurate with the money which is being spent upon it. Let us see whether these criticisms are well founded.

With regard to the first criticism I have had districtwar lists prepared which show that the following numbers of agriculturists have during the past three or four years taken up some definite work in co-operation with the Department :—

Bangalore District	.. .. ..	1399
Kolar „	.. .. ..	1182
Mysore „	.. .. ..	909
Tumkur „	.. .. ..	868
Shimoga „	.. .. ..	792
Hassan „	.. .. ..	1400
Kadur „	.. .. ..	789
Chitaldrug „	.. .. ..	1136
	Total ..	8475

These lists have been checked by the Deputy and Assistant Directors and contain in addition to the names and addresses of our co-operators, the definite kinds of work which they have taken up. These include such varied items as the introduction of improved implements and the introduction of improved agricultural methods of various kinds. They include only those who have been directly in touch with the Agricultural Department and do not take into account the large number who have been reached indirectly especially with regard to the introduction of improved seed. They also do not include the names of those men who have taken up such work as spraying against *Koleroga* and the combative measures against insect pests recommended by the Department. Thus, about 300 agriculturists in Shimoga and Kadur Districts have carried on spraying operations in co-operation with the Department during the past while practically the whole population of over 20 villages in Chitaldrug and Shimoga Districts have co-operated in controlling the serious *Kamblihula* pest occurring in that area. When we remember that our co-operators are to be found in every taluk and practically every hobli in the State and that we are through them reaching many times their number of agriculturists I think every fair-minded person will agree that the criticism that the Agricultural Department is not in touch with our ryot population is unjustified.

Let us now turn to the second criticism that the Department is not providing service commensurate with the money that is being spent upon it. I need hardly remind you that this is a criticism which has been levelled against practically every Agricultural Department in the world. In its early years an Agricultural Department's attention must be mainly focussed on investigation and this must always form the basis of its work. It is like a large factory or other industrial concern which can hardly be expected to pay dividends during the years of construction or as a matter of fact for some years after. Had the above criticism been directed against our work five or six years ago I should, I fear, have had to take shelter behind some such explanation as the above, but now I am thankful to say I have a reply which is more likely to satisfy our financial critics.

Let us try to form some estimate as to the returns which have

accrued to the ryots of Mysore during the past year as a result of the work of the Department.

In the first place let us consider the question of improved implements. During the past ten years the Department has introduced into the State over 7,000 improved ploughs. As a result of its demonstration work at least half as many more have been sold by private agency. The life of a plough in this country is certainly ten years, if renewals are regularly made but to be on the safe side let us estimate that one-third of these ploughs are now out of commission. That leaves 7,000 improved ploughs working in the State. I think we can safely estimate that these ploughs plough on an average 10 acres each per year. That means that 70,000 acres were ploughed with improved ploughs during the past year. A very conservative estimate would allow for an increase in production of Rs. 5 per acre from the use of these implements. From this we see that this one item of our work has during the past year benefited the ryots of the State to the extent of at least Rs. 3,50,000. Ploughs form only a part of the large number of improved implements we have introduced. These include among others cultivators, harrows, sugarcane mills, and jaggery boiling outfits. A very modest estimate indeed would allow for an increase or saving from their use of Rs. 50,000. The benefits from the introduction of improved implements thus reach the respectable total of Rs. 4,00,000.

Next let us turn to the question of the introduction of improved seeds. In the first place we have introduced varieties of sugarcane in over 2,000 acres of our sugarcane land. These varieties have undoubtedly given an average increased return of Rs. 100 per acre to the ryots who have grown them or a total of Rs. 2,00,000 for the State. Quick growing varieties of groundnut have been introduced on more than 2,500 acres in the western part of the State where this crop was not previously grown and the cultivation of this crop has been stimulated in most of the other districts as well. An increase on this account of Rs. 1,50,000 can be safely estimated. Lastly we have our introduction of improved ragi seed which extended during the past year over between 6,000 and 7,000 acres. This has been estimated to have brought in an increase of over Rs. 1,00,000.

Then we have the introduction of commercial fertilizers of all

kinds and the popularization of green manures which have spread in many areas owing to the efforts of the departmental staff. I think it is safe to estimate the value of this work at Rs. 1,00,000.

Finally we have the work that the Department has done in combating *Koleroga* and insect pests. I have no hesitancy in putting the value of this work to the ryots of the State at Rs. 50,000. The work on Koleroga alone saved crop to the value of Rs. 25,000 to Rs. 30,000; the returns to the ryots of the State during the present season have been double that amount.

If we add together the various items given above we get a total of Rs. 10,00,000. This estimate I consider a very conservative one and by no means represents all the service which the Agricultural Department has furnished to the State. I may point out here that the work of the Agricultural Department is cumulative in its effect and that therefore there is certain to be a very marked increase in returns from year to year. When we remember that the Agricultural Department as a department has existed only since 1914, I do not think our record is one at which our financial critics can really take much exception.

If we urn to the investigation side of our work which is likely to lead to important improvements in the future, I may point out that we have a plough under construction the working of which will be demonstrated to you during the present meeting and which is likely to mark a distinct advance in cultivating implements in this State. We have new varieties of cotton, ragi and sugarcane, which seem certain to lead to large increases of production in this crop. The Chemical Section is carrying on important investigations on the availability of various commercial manures to crops which will enable us to give more exact information as regards the most economical methods of manuring. The Mycological and Entomological Sections which have already given back to the ryots of the State more than has been spent upon them are investigating a large number of the most important of our plant diseases and insect pests. The results of our cultivation experiments on ragi and sugarcane have enabled us to recommend definite improvements with regard to the cultivation of these crops, improvements which are already being taken up by the ryots of the State. The newly created Live Stock Section has already accumulated

valuable information with regard to the more economical utilization of fodder, while along with the Veterinary Department it has begun an active campaign towards the improvement of our Live Stock. The Sericultural Department which has recently become associated with us and which has already rendered important financial service to the sericulturists of the State, is engaged in experiments on improvement of sericulture and improved methods of reeling which are certain to result in returns to the State far in excess of the money spent upon it.

As I have already stated, much of the above information is well known to some, if not all of you, but I am anxious that you, the members of this Union, should be fully conversant with all the activities of this Department. We have nothing to hide from you or as a matter of fact from any one in the State and I trust you to do your best to enlighten those less well-informed on agricultural matters as to what is really being done. You can and should be our most efficient publicity agents. It seems to me however a matter of comparatively small moment whether you answer individual critics or not if you spread in your own neighbourhood the implements and crops and methods of cultivation which you have personally found profitable. That I am glad to say many of you are now doing but I feel that much more can and should be done.

Before closing my remarks I must apologize to the Union for one failure to carry out their decision. At our last meeting it was resolved to hold a second meeting in May at the time of the Departmental Conference. Unfortunately my health was such that it was impossible for me to preside at any meetings at that time. The Departmental Conference was therefore postponed to the last week of August. I felt that as our regular annual meeting was to be held in November, it would have been unwise to call another meeting at so late a date and I trust you will agree with me in my decision.

Now, Gentlemen, we have a large programme before us and I shall not detain you longer. I trust that our discussions during the next three days may lead to more extended knowledge of our agricultural needs and possibilities and to more definite plans of work for the coming year.

Supply of Irrigation Water from Wells and Rivers *

BY

H. Srinivasa Rao,

Retired Deputy Conservator of Forests, Hongenahally, Malur.

Irrigating is the most important item in the cultivation of crops. In Mysore the sources of irrigation differ in different places. In the *malnad* tracts the rainfall is abundant and continues for a long period ; the crops there hardly require any artificial irrigation. Even when the rain stops the springs keep flowing and it only requires to turn off the flowing water to run over the fields. No artificial reservoirs or lift irrigation is needed in those tracts. Where perennial streams flow and where dams have been constructed across them channels form the source of irrigation though the area under this kind of irrigation is comparatively small. In places where no irrigation is possible by river channels, tanks form the main source of irrigation and the area irrigated by tank, is the largest under artificial irrigation in the Province. Bangalore, Tumkur and Kolar (especially the last) are the largest tank districts. In these districts there is hardly any valley which does not contain a tank or a series of them one below the other so that nearly the whole length of the valley is under either wet or garden cultivation or is the area of water-spread (except a small portion at the starting point of the valley). Irrigation by rain and springs of the *malnad* tracts and irrigation by river channels are all reliable to a great extent as the western border of the Province where such irrigation is in vogue, enjoys a much heavier rainfall than the eastern. Some heavy rain is sure to fall on the Western Ghats which are covered with dense evergreen forests and the so-called *malnad* tracts comprise this Ghat region and all areas to the east of it for some distance also, which are covered by the relics of what was once a dense forest. As all the rivers which give off channels take their rise in this ghat region the channels are also reliable. What is very precarious is the irrigation by tanks. It is precarious as it depends always upon the inland tracts. These tracts being farther from the ghat regions and as little or no forest growth is found in the *maidan* tracts rainfall is rarely normal. It is often too poor or too heavy and irregular. Deficient rainfall means non-supply

* Paper read at the IV Annual Meeting.

of water to tanks and too heavy a fall often breaches the tanks. Irrigation by tanks is for this reason very uncertain ; not infrequently the crops sown under them do not require to be harvested but are grazed down. Failure of crops often lands the country in food and fodder scarcity, and unfortunately for us famines and scarcities are not rare.

2. As a provision against droughts and famines it is necessary to supplement tank irrigation with irrigation by lifts which could be resorted to in case tanks fail. Even where tanks are more reliable commanding as they do large catchments and heavy rainfall, they usually dry up in the hot season when water is most required for the hot weather crops. In many instances the extent of cultivation is greater than what the tank could irrigate. In such cases the crops fail unless it fills frequently during the cultivation season. For this reason, the sowing of *Kar* crops rarely obtains in the *maidan* taluks, and even garden crops cannot be raised in the hot season, for want of water. Lift irrigation is possible only where springs could be tapped within 20, 25 or 30 feet of the surface and also from streams where they contain water in summer. The level of the under-ground water is not only influenced by the geological formations but it is in a great measure dependent on the quantity of rainfall and facilities for soaking into the ground. The larger the number of tanks and the more extensive the areas under water-spread and under wet cultivation the greater is the percolation into the ground and the more abundant the under-ground supply. The springs are higher where percolation is great. These conditions are more marked when the land is flat. For these reasons in the *maidan* tracts where tanks abound there are greater facilities for irrigation by wells than in the tankless but open *sub-malnad* tracts where the surface undulations are more pronounced. Hence in the districts of Kolar, Bangalore and Tumkur and nearly all the *maidan* tracts where tanks abound, wells could be sunk with advantage and it is just there that well irrigation is very much wanted. To minimize the evil effects of famines it is very necessary to increase the areas under well irrigation to the largest possible extent.

3. At present there are considerable areas under well irrigation both under tanks and higher up in dry fields but the extent is too small to produce enough food for the requirements of the people in seasons of drought ; well sinking has therefore to be encouraged on a

large scale to produce food in famine times and to grow industrial and commercial crops in years of plenty, as irrigation could be ensured in all seasons.

4. But there are many practical difficulties in well sinking, which, under the present circumstances, are difficult to overcome, and unless measures are adopted to facilitate this work no real improvement is possible.

The following are the main difficulties, *viz.*:—

(*a*) *The financial difficulty:*—

Irrigation wells are required only by the cultivating classes ; but 90 per cent of the cultivators are unable to find money for constructing permanent wells. Government has done and is still doing much by making *takavi* advances : but owing to other difficulties, natural and artificial, the object with which the advance is made is rarely fulfilled. The money is often spent on marriages, or for repaying debts and supplying family needs and a percentage of it often goes to those who *help* the ryot in getting the loan. Government has lately ordered that the advance should be paid in instalments after seeing the work done but even this is not satisfactory and mostly some show of work or only bad work is done and money secured. This kind of work though not intentional is very often unavoidable owing to the difficulties of the season, labour conditions and family circumstances, etc. Extensive *takavi* advances are made especially in famine years when people are hard up for food and any money then put into the hands of ryots goes to the stomach in preference to the well. I know all this from my personal experience in village life and this points to the necessity of introducing reforms into the *takavi* dealings.

(*b*) *The labour difficulty:*—

Well sinking requires much experience and promptness of operations to prevent losses but the labour we have to employ for this work is inefficient and unequal to the task. Stone *Waddars* and earth *Waddars* are the chief classes whom we have to engage for digging and rivetting : but these are the primitive classes mostly given up to drinking and lawlessness. They are ready to bind themselves by contracts but never care to stick to their terms. They behave most irresponsibly and have nothing to lose, neither fame nor property, in case any law suit is decided against them. Most of them are vag abond

and are only eager to enter into contract with somebody and prey upon him. They quarrel and often strike work if their repeated demands are not satisfied. When the work of a well is half done, stopping it means heavy loss due to the accumulation of water, falling of sides, the approach of rainy season when no well sinking is possible or the drying up of crops. In the event that any of these happens when a well is being sunk, what has been till then spent will be lost and heavy additional expenditure has to be incurred to rectify the damages.

For this reason once the work is commenced, demands of the workmen have to be compulsorily met with even though the payments far exceed the contracted sums. With a view to getting the man into their clutches these workmen are often very vigorous at the start till sufficient progress is made, so much that the work cannot be stopped without loss, and then commence to play their dodges by demanding frequent and heavy payments and if their demands are not complied with they strike or stop work or take up some other work. Under such circumstances very often the contracted period will have passed. Heavy losses are often caused, separate workmen have to be engaged at high rates and the estimated expenditure is more than doubled by the time the work is complete and even then the work done is unsatisfactory or the depth sunk is quite insufficient to supply sufficient water in the dry season. I bear testimony to the above facts having personally experienced all these difficulties.

With all my precautions, I am sorry to say, it has been my fate to suffer at the hands of *Waddars* and *coolies*. I had to spend Rs. 140 more on each of the three wells I attempted to construct in 1908, and the period of three months contracted by them extended over two years. In the same year, I know of many people who attempted to sink wells and who for these reasons stopped work losing what they had till then spent. The majority of our cultivating ryots are a quiet and smooth-going class of people, very economical and unwilling to be dragged into troubles of any kind. They are afraid of the rowdyism of the *Waddars*. This makes them hold back from attempting well construction. In fact the majority of our wage-earning classes and artisans such as carpenters and smiths are unbusiness-like people, often given up to vices. Value of time, economy and business

habits are rarely noticeable among them. This is the real impediment to all progress. Want of education is the cause of all this. These, therefore, point to the necessity of having a set of trained workmen of business-like habits to work in well construction.

(*c*) *Difficulty due to water accumulating:—*

Once water is tapped, the deeper we sink the larger is the quantity of water that keeps flowing in, and to clear it various devices such as picotahs and kapiles, are employed. Not infrequently digging to a greater depth below the water-table becomes impossible as the above appliances are unable to cope with the work. In ordinary practice all work is stopped at night and when a certain depth has been reached the water that collects at night affords work to the lifts for many hours in the morning and no digging is possible till the water is all removed. This means that the time for digging becomes shorter and shorter day by day as depth increases and when emptying out water becomes difficult they at once conclude that an inexhaustible spring has been tapped and further digging is unnecessary. The depth reached is often insufficient to ensure a sufficient water supply. But the difficulty of emptying out the shaft compels them to stop digging and proceed with the rivetment at once. The wells so constructed are often found to be shallow and run dry in seasons of prolonged drought thus causing loss of crops. Shallow wells are worse than no wells : for they contribute to the loss of crops raised trusting on their water supply. The difficulty of emptying out the water during the sinking of a well is very often the cause of shallow wells. Hence, pumping is quite necessary if wells are to be dug deep.

(*d*) *The falling sides:—*

In many wells the sides are of some soft earth and easily collapse : the falling sides undo all that is done besides endangering the life of workmen. This is another great difficulty and owing to this trouble wells are rivetted with stone even when the required depth has not been reached. To prevent the falling of sides the Madras system of well sinking (with brick rivetment on well rings) has to be adopted or the sides have to be secured by planks and props as in the mines. Another plan may be adopted to minimise this risk. When the water level has been reached only the space required for rivetment may be dug leaving the middle portion untouched. By this method earth-

work is curtailed and the well is rapidly finished affording fewer chances for the sides to collapse. In any case proper material, skilled labour and very expeditious work are required for satisfactory work and this cannot be expected of the ordinary class of cooly labour and *Waddars* available.

(*e*) Stones are not procurable in many places and even where procurable burning and quarrying is often difficult. When stone quarrying is difficult, people who split unburnt stone may be engaged to collect them. Where no stones are procurable, bricks have to be used in place of stone as in Madras. This again requires trained brick makers and stone quarriers whom the ordinary ryots cannot hope to secure locally.

(*f*) To minimise the cost of construction, wells of smaller diameters may be dug securing at the same time the advantages of wells of larger dimensions by running horizontal tunnel borings at the bottom so as to resemble the prolongation of the two diameters crossing at right angles. Into these borings large earthen pipes with holes may be introduced or stone slabs may be introduced and tunnels constructed to increase the water supply by tapping more subterranean channels besides serving as storing places for the accumulated water. Wells with these wings have an advantage over those that have not got them. The water supply in such wells is more abundant. A well 10 feet in diameter provided with four right angular horizontal tunnels each 6 feet long beyond the wall of the well, is likely to command the canvassing capacity of a well with a diameter of 15 or 20 feet, as it could tap more subterranean fissures and channels through which water courses or in which water is stored. I do not presume that this has been mathematically ascertained but there is every probability of its being nearer the truth as there are instances of wells so constructed having more abundant supplies than others.

This tunnelling and layings of pipes or slabs could not be possibly accomplished by unskilled men and without the improved tools for boring and wooden planks for keeping the collapsing sides.

5. For the above six reasons I am led to believe that well sinking is not a job that could be successfully undertaken by each and every ryot. It requires much money and skill, trained workers, machinery and stones all of which very few ryots can afford to secure.

Therefore I think it is necessary to entrust all well sinking to big contractors who on account of the largeness of the business they have to do, can well afford to maintain organized gangs of skilled labourers, keep implements and pumps and other appliances to finish the work within a short time. This saves all the trouble, personal worry and frequent disappointments and losses to the intending well sinkers which they have to undergo if they do the work themselves.

6. If the owner of the lands binds himself to repay the cost of the well as *takavi* loan the work may be got done under contract system as above. Many wells may be entrusted to a contractor in a season. Government agency has only to supervise and the owner of the well is at liberty to watch and see to the stability of the work at every stage pointing out any defects and frauds.

7. The following procedure is suggested to carry out the above suggestions and they may be considered over and introduced experimentally in one or two places to see if they are worthy of general adoption.

(i) Applications may be invited from intending well sinkers of a taluk whether they like to have them constructed under Government Agency.

(ii) To see whether water could be successfully tapped in the spots they propose, they may be asked to dig a test hole $2\frac{1}{2}$ to 3 feet in diameter and to a depth of say about 6 feet below the underground water surface. These test wells not only enable us to judge of the water supply but also give a data as to the nature of the soil to be dug through and the probable cost of digging it.

(iii) As soon as report is received of the completion of the test well an expert may be deputed to test the sources of water supply and prepare an estimate for the description of the well the proposer wants, taking into consideration the supply of stones, the lead, etc. The test well and surrounding wells, if any, will be his guides in judging the probable supply in the future well. The estimate will be made for the probable actual cost basing it on the dimensions and particulars of work to be specified by the applicant.

(iv) To this estimate a profit of 15 to 20 per cent may be then added as per circumstances of each case as a contingency for unforeseen expenses and emoluments of the contractor.

(v) Then the estimate with the contractor's commission may be placed in the hands of the applicant who may be asked if he is willing to accept the amount as a takavi loan when the well is made. If he agrees, the work may be given out to a qualified contractor who has provided himself with organized labour, pumps and other appliances. An oil engine may be supplied by Government for the use of the contractor to commence with. He may be given as many wells as he could finish in a year from 1st January to end of June. When the work is finished his bill may be paid by Government.

(vi) An Engineering expert has to be set to supervise the work.

(vii) Collection of materials, such as stone jelly, or brick and their carting to the site may be allowed to be done by the owner of the land at his own cost if he likes to do them, on condition that it should be accomplished before a certain date. In this case the cost of those items may be omitted from the estimate as also the cost of all other items of work which he binds himself to undertake in this concern ; the contractor may collect his own materials if the owner is unable to do so.

(viii) The applicant has to render all possible local help to the contractor when engaged in his work.

(ix) An experimental beginning may be made in some locality in order to test the possibility of the scheme and to find out the practical difficulties that come in the way.

8. Of course these proposals are not final and many modifications and changes may have to be made as experience is gained. They are given here only to point out the general method to be adopted.

9. The applicant may think an additional 15 or 20 per cent is too heavy for him but I am of the opinion that 20 per cent is low and it may even be 25 per cent owing to losses and unforeseen troubles with which the work is beset. In ordinary practice well sinkers spend about 25 to 30 per cent more than the actual cost in the way of losses of advance and additional expenditure due to unforeseen causes, etc. Considering the facilities afforded to them which save all troubles and losses, they may willingly pay it.

10. Government may charge an additional interest of one anna or two on the takavi loan for the wear and tear of oil engine and the cost of expert supervision.

11. With the increase of wells, pumps and water lifts will be required on a large scale.

12. Apart from well irrigation there is scope for extension of irrigation by lifts on the banks of streams and rivers which can afford a supply of water. All the large rivers and most of the streams and even nullas are fit for this purpose as they contain sufficient supplies for lift irrigation even in the hot weather.

13. Taking the several rivers that flow through the Province there is hardly any of which the waters are lifted for irrigation. The Cauvery, the Kapani, the Nagu, the Hemavati, the Yagachi, the Tunga. the Bhadra, the Lakshmanateertha, and many others of which a long list can be given, flow for many hundreds of miles unutilized for irrigation ; where a perennial stream is running, its banks are generally untilled or are put under precarious dry crops of low value. The people have not learnt to utilize the water to the best advantage possible. If only lifts could be put up on the river banks thousands of acres of what is now dry and waste land could be brought under wet and garden cultivation. Pumps and oil engines could be profitably installed on the river banks for this purpose. It requires a combination *i.e.*, co-operation of ryots to undertake such things, and as the people now have divided interests and are ignorant of the benefits of combination they have to be bound together by some outside force till they can see and realize the advantages for themselves. In the riparian taluks an initiative may be taken by Government to induce some enterprising persons to start pumping for irrigation. If only one example is set, it is hoped many will follow. The rivetment of river banks where pumps have to be installed may be given over under contract system as in the case of wells described above. In these days of agricultural improvement, this question of irrigation by lifts is very important and some initiative may be taken to do it practically so as to set an example to the people. I place this paper before the Union with a request that it may be made known to all and that they may take some initiative by forming co-operative societies for the purpose.

Notes on the more Important Insect Pests of Crops in the Mysore State.

BY

Mr. T. V. Subramania Iyer,

Assistant Entomologist, Mysore Agricultural Department.

(Continued from our last issue.)

II. LEPIDOPTERA (cont.)

8. The Potato Caterpillar.

Phthorimœa operculella, Z.

(*S.S.I.I., p.* 455, *pl.* 44.)

The insect is found in all potato-growing areas of the State as an occasional serious pest both in the stored tubers as well as the crop in the field sometimes. The caterpillars are very small, smooth and whitish in colour with a brown head. The moth is a very small, active brown creature. It lays eggs on the eyes of the potato tubers which hatch out into tiny larvæ which bore into the tubers and tunnel inside. Thus the potato becomes rotten and unfit for human consumption or seed purposes. The pest is commonly found in July and October. A field of over two acres in extent was found completely destroyed by the larvæ boring into the shoots of the plants in Kodaganur (Chitaldrug District) in August.

Control.—Seed potatoes should be stored under dry sand. The seeds should be examined often and all rotten ones removed and destroyed. Only healthy and good seeds should be planted.

9. Nymphula depunctalis, Gn.

Kokkare roga—Canarese

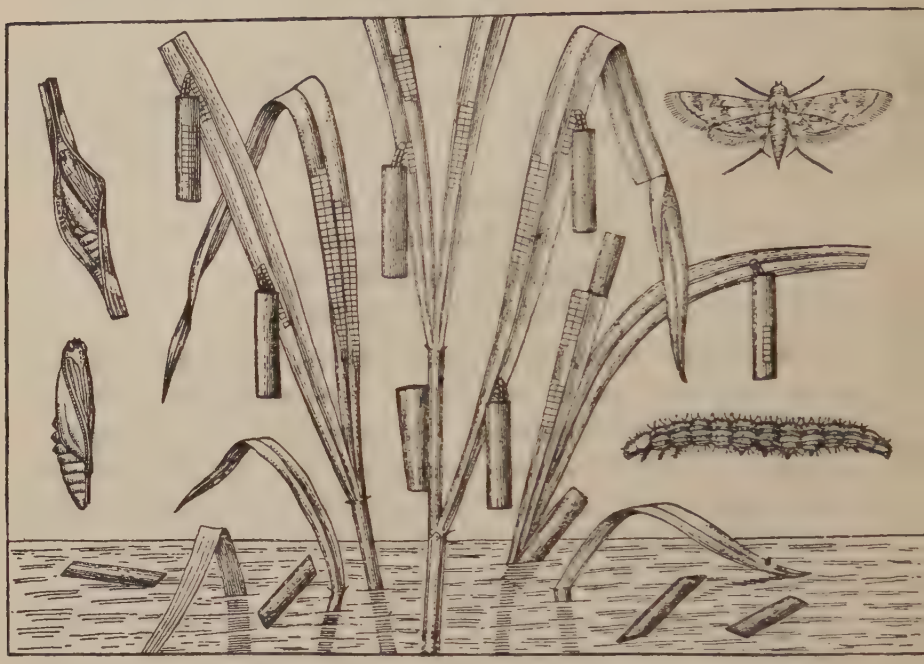
(*S.S.I.I., p.* 430, *pl.* 32.)

Mysore Agricultural Calendar, 1916, p. 31.

(*Mysore Entomological Circular No.* 17.)

An occasional serious pest of paddy occurs in Maddur, Mysore District and Kadur District in September-October. The caterpillars are thin, long, light green and live in cylindrical cases made of paddy leaves. They move about the plants carrying these cases, the head alone being visible. They are able to breathe both in and out of water. The injury to the plants consists in the caterpillars eating up the epidermis of the leaves. In a bad attack the fields look quite pale and

sickly. In mild attacks patches are eaten up here and there in the paddy fields.



Control.—The water standing in the paddy fields is kerosened a little so that a very thin film is formed on the surface. A rope is drawn across the crop by two people; the caterpillars drop on to the kerosened water and die.

10. The Paddy Stem Borer.

Schoenobius bipunctifer, Wlk.

(*S.S.I.I., p.* 426, *pl.* 29.)

The pest occurs in September-October as an occasional serious pest of paddy in Tumkur and Maddur (Mysore District). The caterpillars are long, very slender, pale yellowish white in colour. They bore into the main stem of the plants and then remain there feeding and developing. Thus the central shoots fade and dry in the case of young plants but if the attack is at a time when the plants are just forming ears, no grain is formed. The moths are found on the wing in August-November.

Eggs are laid in masses on paddy leaves, which on hatching bore into the stem.

Control.—Larvæ and pupæ were found in the stubbles after the harvest of paddy. Ploughing up of this may be found useful. Moths seem to have attraction to light ; light traps may be useful. Nothing practical has been done yet in the State regarding this pest.

11. Cotton Semi-looping Caterpillar.

Cosmophila erosa, Hb.

(*S.S.I.I., p.* 391.)

This insect is seen in many of the cotton-growing areas in the State as a very minor pest. It appeared once as a very serious pest in Mandya, Mysore District, where a large area of Cambodia cotton was attacked in October. It is a medium sized-greenish caterpillar which moves with a looping motion. The moth is yellowish brown. In the case of the serious attack mentioned above, before any remedial measures could be adopted, quite a very large number of birds (wagtails) were found to completely eat away the caterpillars so that in a couple of days' time the field was quite free of the pest.

Control.—Hand-picking and destruction of the larvæ in the early stages may be useful.

12. Cotton Leaf Roller.

Sylepta derogata, Fb.

(*S.S.I.I., p.* 434, *pp.* 35.)

This is also found wherever cotton is grown. It is only a minor pest of cotton. The caterpillar is very light, green with a dark head. It rolls up the cotton leaves and remains inside and when disturbed it wriggles out and falls to the ground. Only introduced cottons, *viz.*, Dharwar-American, Cambodia, etc., are attacked. The moth is small, yellowish white in colour with light dark wavy lines on the wings.

Control.—Early removal of the infected leaves will be found effective.

13. Spodoptera mauritia, Boisd.

(*S.S.I.I., p.* 378, *pl.* 20.)

This insect is known to do very serious damage to paddy nurseries

in the Madras Presidency. The caterpillars are pale greenish yellow with brownish stripes. They are smooth and measure from 1″ to 1½″ when full grown. When disturbed they curl up to one side. During day time they hide under the soil and feed at nights. Perhaps it might be noticed as a serious pest of paddy nurseries in the State here and there.

Control.—Plenty of water was allowed in the nursery bed and the seedlings were transplanted soon. No further trouble was noticed in the adjoining seed beds.

14. Saluria inficita, Wlk.

(*S.S.I.I., p.* 427.)

This insect is a stout, smooth, white caterpillar. It is known as a specific pest of ragi plants in the Madras Presidency, the caterpillar boring into ragi stems very near the roots. Although Mysore is a very large ragi growing State, this insect has not been known to attack ragi. In September-October 1920, this insect occurred as a serious pest of *dryland paddy* (Can. *Barabhattha*) in Maddur, Mysore District. A couple of acres were badly infested. The nature of attack on paddy was identical to that on ragi. It will be rather a serious affair if it takes to the destruction of ragi plants in future.

Control.—As water was available in plenty during the months the pest occurred, the fields were given a good supply of water which was allowed to stand for a few hours in the infested area. The plants picked up very well afterwards and there was no more trouble.

15. The Jola Earhead Worm.

Stenachroia elongella, Hmp.

(*S.S.I.I., p.* 421.)

This is an occasional serious pest of *jola* earheads in Mysore Dt. The caterpillars are thin, long and whitish. They web up the grains in the earheads and live on the grains. The earheads look as though they are covered with cobwebs and a lot of excrement and broken portions of the grain may be seen sticking to the web. The moth is small and yellowish white in colour. The pest is generally found in August.

Control.—The first attacked earheads should be destroyed; if the attack is found about the harvesting time, thrashing the grain immediately after harvest.

16. The Pomegranate Fruit Borer

Virachola isocrates, Fabr.

(*S.S.I.I., p.* 416.)

The caterpillar is thick and dark with patches of white. The butterfly is a small beautiful violet blue one which lays eggs on the flowers and small fruits of the pomegranate. The larvæ on hatching bore into the developing fruits and consume the seeds and develop. This is a serious pest of pomegranate fruits found generally in March-April. This insect is also known to damage guava, orange and tamarind in other parts of India.

Control.—When the eggs are laid in the flowers it is rather difficult to save the fruits. Small-sized fruits are well rubbed with a rag to dislodge the eggs laid and pieces of cloth are tied round each individual fruit. This is found to save a large number of fruits.

17. Caterpillars boring into Sugarcane.

(*a*) *Scirpophaga xanthogastrella* (*auriflua*).

(*S.S.I.I., p.* 425, *Ento. Memoirs, Agri. Dept., Pusa I, p.* 199; *Ind. Ins. Life, p.* 511, *pl.* 47.)

This is found as one of the serious pests in all the cane-growing tracts of the State. The moths are pure white in colour. The female moth has a tuft of orange coloured hairs at the end of the abdomen. The moths are found on the wing generally from February—April. They are also found from September—November. Egg masses, covered with hairs from the anal end of the abdomen of the moth, are laid on sugar-cane leaves; very active young larvæ hatch out from 5 days to a week. These cut through the rolled-up top shoots and enter the stem and in a short time the top shoots wither and die. Although new shoots are sent out from the roots, there is a great set-back in the growth of the cane. In the case of older canes, the larvæ make tunnels, further growth is stopped, side shoots are thrown out and a bunchy top is formed. The larvæ pupate inside the tunnels in the cane after cutting an exit hole in the rind.

Control.—When the infestation is very bad, the egg masses which are conspicuous objects on the leaves are collected. The egg masses should be kept in a small vessel in a basin of water to allow the small chalcid parasites which parasitise the eggs very heavily in certain years to escape.

(ii) Cutting out all plants showing the dead-heart and wilting top shoots and destroying them with the larvæ.

(iii) The moths are found to breed freely in a species of cyperus which grows in abundance wherever sugar-cane is grown under tanks. Destruction of these wherever possible.

(*b*) *Sesamia inferens, Wlk.*

(*S.S.I.I., p.* 379, *pl.* 21.)

Like the previous insect the caterpillars enter the stem of young seedling canes and damage them. The withering of the central shoots occurs and young canes are more attacked than older ones. The caterpillar is whitish with a red head and measures about one inch long when full grown.

The caterpillars are known to be stem-borers of paddy, jola, maize, wheat, etc., in several parts of India. In the Mysore State it is also found as a jola and wheat stem-borer, but not very serious generally. It was found bad enough on sugar-cane in Bangalore. The moths are generally found in May. Only very few specimens were obtained in February.

Control.—Cutting out of the plants showing the dead and wilting central shoots and destroying them. It is kept in check to a certain extent by a Tachinid fly parasite. While examining a number of attacked young cane seedlings in April 1920, I found about 70% of the larvæ parasitised by the fly.

(*c*) *Diatræa.*

Several species are found damaging sugar-canes. The moths are found in large numbers in May.

The attack and the destruction of the cane is similar to the above and the control measures too are more or less similar.

(*To be continued.*)

Abolition of *Gomal* Lands.*

BY

Mr. N. Rama Rao, B.A., B.L.,

Superintendent of Sericulture in Mysore.

This is a subject of which I may claim some knowledge both as Revenue Officer, and as Secretary to the Agricultural Committee. As Revenue Officer, it was my constant endeavour to get the ryots to do something sensible with the gomal, and as some technicality or other pulled up each time, I felt that the law forbade improvement of the gomal. As Secretary to the Agricultural Committee, I aided in attempts to improve the law as a means of improving the gomal but with the same futileness. When you go to a village, you don't need anybody to tell you which bit of land is the gomal. You just go to the bleakest, God-forsakenest looking piece of waste where nothing grows but shingle and thorn, and where there is neither grass nor shade, nor in most cases water — and that is the gomal. When villagers have sometimes objected to the grant of gomal for cultivation on the ground that their cattle graze there, I have wondered what on earth the cattle could find to graze there. I was, I confess, rather amused when Mr. Narasinga Rao proposed (as a means of improving the gomal) that cattle droppings should be suffered to remain to fertilize the soil. Unless one could imagine cattle to get their feed somewhere else, and to resort to the gomal by common consent to enrich it with droppings, this method of improvement is inconceivable.

Time and again, have attempts been made by Government to create interest in the gomal. Villagers were told that they might, if they liked, cultivate their gomal with gram as a community. They were invited to form Panchayets for improving the gomal, and given full powers to plough, to plant, to grow grass, and so on. I could never hear that any great quantity of gram, or grass, or anything else was raised as the result of these concessions. Under only one set of circumstances did the ryots show any unanimity— and that was when somebody had the temerity to propose to cultivate any part of the gomal. Then they rose in a body, and by voice and petition protested in the name of the sacred cow against the profanity implied in the

* Speech at the Fourth Annual Meeting referred to in the proceedings.

darkhast, and this usually frightened both the applicant and the Revenue Officer into dropping the question.

It seems to me that the neglected state of the gomal, and the failure of all attempts to improve it are due to one fundamental reason — the fact that what is everybody's property is nobody's care. Attempts to improve gomal are foredoomed to failure unless they recognize, and remedy for this basic defect. The gomal will always remain a wilderness, unless you bring it under what Young happily calls "the magic of property". During his travels he was greatly struck by the difference between lands which were owned by the cultivators and lands which were cultivated by tenants at will. In the first case, poor rocky soils where nature's self seemed unkind, had been converted to smiling fields and fruitful gardens and in the second case, fertile soils had become desolate wastes for want of work and care. He sought for an explanation and found it. "The magic of property" he exclaimed, "turns sand to gold!" We might continue and say — "the curse of non-property converts gold to sand" — or in other words to gomal. There seems to me, to be, only one way of improving the gomal and that is to abolish it. The gomal is a belated survival of the pastoral age when as yet agriculture was in its infancy, and individual rights had not emerged out of tribal ownership. It is difficult to see to-day a single reason for keeping the gomal alive, and refusing to parcel it out and give it into individual ownership. It cannot be urged that thereby the cattle are deprived of grazing for the gomal is notoriously bare of grass. In fact, cultivated land — even when raising human food is the main object — yields much more cattle food than the same land in a state of nature. This was the experience of war-time agriculture when pastures were broken up for raising food grains.

Even if cattle food grew on the gomal, a common grazing ground would do only if everybody raised a uniformly low grade of cattle. Scientific objections against this existence of gomals will undoubtedly be urged by the Live Stock Expert and the Superintendent of the Civil Veterinary Department. All I wish to say is that the gomals serve no useful purpose, because the fact of their being common property takes away all incentive for their improvement. Unless they are parcelled out and given into individual ownership, so as

to come under the action of the "magic of property," they are bound to remain as they are at present. I know that there will be some opposition, as I found out when I tried to get people to plant mulberry trees in the gomal; but I have no doubt that the gomals *must* go, and that they *will* go as a matter of fact. If a body like this Union records its opinion on the subject, it might hasten the speedy exit of this anachronism.

Cultivation of *Dodda Rasatali* Sugar-cane in Kaddagattur village, Maddagiri Taluk.*

BY

Mr. C. B. Krishnamoorthy,

Agricultural Inspector, Maddagiri.

The main varieties of sugar-cane which are generally grown in these parts are Dodda Rasatali, Chikka Rasatali, and local striped. Generally all the three varieties are grown mixed and can be seen in all the plots. The cultivation of sugar-cane is in practice for a pretty long time.

Rotation :—Generally this is rotated with ragi and paddy as follows :—

1st year Mungar crop irrigated ragi, summer crop paddy.
2nd year again irrigated ragi, and sugar-cane.

The crop in question was cultivated on an area of $\frac{1}{4}$ acre.

Preparatory Cultivation :—In this particular plot for which figures are calculated, the irrigated ragi crop in the second year was not grown, but the land was ploughed seven times during an interval of 8 months, that is, after the paddy of 1919 up to February 1920.

Method of Planting :—The usual method is to open furrows $1\frac{1}{2}$ feet apart with the country plough, to widen it to 2 feet by manuties and to plant the setts in the furrow. When the crop is about a month and a half old, earthing up is done by opening furrows between the alternate rows; there is a ridge having rows of cane on

* Paper read at the Fourth Annual Meeting of the Union.

either side. The advantage here is that the irrigation channel exposes the base of the cane on one side and prevents the formation of sufficient number of roots to give stability to the standing crop, and thus give room for lodging. The method that was followed in this $\frac{1}{4}$ acre differed in as much as furrows were opened between every row planted with selected Dodda Rasatali canes alone, at a distance 3 feet apart, the canes being earthed up from either side. In this method the rows of cane occupy the centre of the ridge and therefore get more stability which seems to be an important factor contributing to the yield of 42 tons of cane per acre. How far the non-wrapping influenced this tonnage is not known.

Cost of Cultivation of $\frac{1}{4}$ *acre* :—	Rs.	A.	P.
7 Ploughings with country plough at As. 6 per ploughing	2	10	0
20 Cart-loads of manure at Re. 1 per cart-load ..	20	0	0
Sheep folding at 500 sheep per night for two nights at Rs. 3 a night	6	0	0
Breaking clods and opening furrows 8 men at As. 4 a day of 8 hours	2	0	0
1,200 double sets at Rs. 17 per thousand ..	20	8	0
Weeding and earthing up	2	8	0
36 Irrigations in March, April and May at the rate of Rs. 12 a month	36	0	0
24 Irrigations from June to January	24	0	0
Fencing the borders	6	8	0
Miscellaneous expenses	0	14	0
	121	0	0

The standing cane crop which was grown with a cost of Rs. 121 was sold in January 1921 for Rs. 340. The usual practice of growing garden togari (*cajanus indicus*) in borders was adopted and 25 seers of the same was the yield. The value of togari obtained is Rs. 5.

	Rs.	A.	P.
Cost of cultivation	121	0	0
Assessment	1	8	0
Total ..	122	8	0

Total Yield :—

	Rs.	A.	P.
Yield from cane plot	340	0	0
Yield from garden togari	5	0	0
2,500 tops at Rs. 17	42	8	0
Total ..	387	8	0
Net expenditure	122	8	0
Net profit	265	0	0

On the above calculations, the net profit for one acre is Rs. 1,060 to the grower.

Cost of manufacturing jaggery by the purchaser :—

	Rs.	A.	P.
Hire on local Sugar-cane mill with two pans for three days at the rate of Rs. 2 per day ..	6	0	0
Cost of milling and Jaggery-boiling	11	0	0
Jaggery-making and other charges	4	8	0
	21	8	0
Value of canes paid	340	0	0
Cost of making jaggery	21	8	0
	361	8	0

The total quantity of Jaggery obtained was 93 maunds which at the rate of Rs. 4 a maund fetched Rs. 372.

	Rs.	A.	P.
Amount realized	372	0	0
Amount spent	362	8	0
Net profit	10	8	0

No fuel is used for boiling juice into jaggery as the megasse and trash alone suffice for boiling purposes. If the jaggery-boiling work had also been undertaken by the grower a sum of Rs. 42 more which means Rs. 1,102 would have been the net profit from one acre of cane crop.

The manufacture of 93 maunds of jaggery was finished in 3 days by having 14 pairs of bullocks, 14 men, two pans and a mill working

both day and night on exchange system which is the practice in these parts. No professional boilers visit these parts as the ryots themselves do the work.

Groundnut Cultivation in Masti, Malur Taluk.

Mr. M. Sreenivasa Iyengar, Landholder, Masti, Malur Taluk, writes to the Director of Agriculture in Mysore, Bangalore, as follows :

I wish to bring to your notice the advantages I derived from groundnut cultivation, one of the crops that I have planted this year as a sort of experiment to find out for myself if it is profitable or not to take up agriculture as my main occupation. I felt too shy to ask my elders and my friends to get me all the necessary implements, etc., required for agricultural operations as my relatives mocked at me for undertaking agriculture as my main profession and for resigning the Government appointment I was holding in the Public Works Department of the Nizam's Government on a salary of Rs. 120 per mensem. I am setting an example to my brethren who are employed on a low salary of Rs. 15 or 25 even though they own lands of their own which they are allowing to run from bad to worse.

I got ploughed my garden which lies a furlong from my cottage, continuously for a period of 6 days immediately after the commencement of the monsoon rains in the month of May.

As some of my friends suggested to me that we can have a good yield from the Mauritius variety of groundnuts, I purchased two *kolagas* of 10½ measuring seers per *kolaga* and got them sowed on an area of 10 *guntas* or ¼ of an acre. I give below the actual sum of money that was spent by me from start to finish.

Date of sowing Mauritius groundnut seeds, May 16, 1921.

Date of harvesting, *i. e.*, picking out groundnuts, October 1, 1921.

Expenditure.	Rs.	A.	P.
Ploughing with one pair of bullocks for 6 days at 8 annas per day	3	0	0
Cost of seeds at 12 as. per kolaga ; 2 kolagas .. .	1	8	0
Removing weeds 2 men coolies at 4 as. per head and 2 women coolies at 3 as. per head per day, for 2 days ..	1	12	0
Watering charges once (for want of rain) 2 men coolies at 4 As. per head per day and 1 woman cooly at 3 as.			

	Rs.	A.	P.
per head, for half a day	0	5	6
Sundry expenses	0	6	6
Harvesting, *i.e.*, picking out seeds	7	8	0
Total expenditure ..	14	8	0
Yield—3 candies 15 kolagas. Market value at Rs. 16 per candy for 3 *candies** 15 *kolagas* ..	60	0	0
Expenditure incurred	14	8	0
Net profit	45	8	0
or profit from 1 acre	182	0	0

Though the market value has fallen much when compared to last year, I was fortunate enough to get a sum of Rs. 45½ in a period of 4½ months which means an average income of Rs. 40 and odd per month from one acre of groundnuts with little labour and capital. In addition to this, I have got planted potatoes, groundnuts, coriander, etc. ; I will let you know the results immediately after the harvest is over.

Our Members' Work—Results of plough Trials.

REPORT I.

H. Sreenivasa Rao,

Retired Deputy Conservator of Forests, Hongenahally, Malur Taluk.

1. *The M. S. M. Railway-Workshop made Hebbal Plough.*

Soil.—Red sandy loam not cultivated for five or six years.

Depth of furrow cut.—5½″

Width of furrow cut.—10″

Inversion.—Good, better than Kolar mission plough.

Quantity of work turned out.—500 square yards in one hour. About an acre and a quarter was ploughed with this plough in this soil.

2. *Kolar Mission Plough.*

Soil.—Red sandy loam not cultivated for five or six years.

Depth of furrow cut.—5½″

Width of furrow cut.—8″

Inversion.—Good, but not equal to the Hebbal plough.

Work turned out. 450 square yards in one hour.

* 1 *kolaga*=10½ *seers*. 1 *candy*=210 *seers*.

It was compared with Kolar Mission plough tried side by side in the same soil and it gave the following results :—

The Railway-workshop made plough was also used in stiff clay loam soil not ploughed for over a year and it did very satisfactory work. But judging by the way the bullocks pulled this and the Kolar Mission plough (the same pair being used for both the ploughs). I can say the Railway-workshop made plough is heavier to pull but I had no dynamometer to test the draught.

The dead weight of the Railway-workshop made plough is greater than that of the Kolar Mission plough, the sheet iron used for the body being too thick. The plough, though strong, is rather difficult to carry.

Further trials will be made when rain falls next.

REPORT II.

Test of the M.S.M. Railway-workshop made Hebbal Plough in contrast with other makes.

W. Davison, B. S. A.,

Live Stock Expert in Mysore, Bangalore.

The soil graded across the plot of land ploughed was from a strong gravelly laterite, to a stiff, black clay. The laterite was very weedy and dry, almost too dry to plough, the heavier land was a clean sunflower stubble with a fair sub-surface moisture, and beyond was a strip which had been ploughed six weeks previously and was in a fairly friable condition. The ploughing was done across these three sections so that each was encountered in every furrow. The same pair of bullocks and driver were used in every instance on the same land, and the plough was held both by me and the driver in turns, and measurements noted in each case.

Although the ground was hard in the upper part, no difficulty was experienced in getting the bar point to enter. In fact, after rounds were ploughed it was found that the point had slipped back to the level of the share, with only a slight difference to the suck. After some trials, it was found best to have the point protruding 2″ from the landside extremity of the share.

Dynamometer tests were made, and the average draught taken after several rounds. In the land which had been previously ploughed, the draught was lighter with each plough, and was recorded. The ploughs not of the bar point kind were fitted with new shares for the test.

The results are as tabulated ;—

	Hebbal Plough	K. M. Plough	Sabul Plough	Verity Plough
Ease of penetration into the soil.	Penetrates well, even in hard ground.	Penetration not good. The handles had to be elevated to keep the plough in the ground.	Penetration good.	Penetration good, but was difficult to keep at an even depth without a slide.
Inversion of soil.	Good.	Poor.	Very good.	Very good.
Steadiness of plough in work.	Very steady and easy to hold.	Unsteady, and not as easy to hold as the Hebbal plough.	Very steady. The easiest plough of the four to hold. This is probably due to longer sole plate and handles than the two smaller ploughs. The remark does not apply in case of Verity.	Steady, not so easy to hold as the Sabul.
Type of cattle employed and nature of the pull.	A pair of Hallikar draught bullocks was used on all ploughs. They were only fair cattle and weighed about 600 lbs. each. The pull was not quite steady on account of hard ground and the presence of small roots. This land has only been broken from jungle for one year			
Average width and depth of furrow.	8-9″ x $5\frac{1}{2}$-$6\frac{1}{2}$″	7″ x 6″	10″ x 6″	10″ x 6″

	Hebbal Plough	K. M. Plough	Sabul Plough	Verity Plough
Quality of furrow as a clean cut one, bottom free from ploughed soil or otherwise.	Furrow slice was broken but was completely cut and lifted clear. A certain amount of loose soil fell back into the furrow.	Furrow broken as in Hebbal, but there is a tendency to cut and cover which results in a narrower furrow being turned up. Dirt fell back into the furrow to a greater extent than the Hebbal plough and occasionally the whole furrow would fall back.	Furrow slice broken but lifted clean. The furrow was left very clean and free from loose soil.	Much the same as the Sabul but not quite so clean a furrow left behind.
Draught as indicated by dynamometer.	$3\frac{1}{2}''$ x $2\frac{1}{2}''$ on ploughed land	$3\frac{1}{2}''$ x $2\frac{1}{2}''$	$1''$ x $3\frac{1}{2}''$	$4''$ x $''3\frac{1}{2}''$
Scouring.	Excellent, with a slight tendency to clog in worked land.	Good, clogs in worked land.	The ploughed board was rusty to start with but showed a good scouring after a few rounds.	Excellent.

Comparing the two lighter ploughs on the basis of this trial, I consider the Hebbal plough a very much better implement than the Kolar Mission. When the share of the K. M. becomes worn the comparison is still more favourable. A later report will be made upon the wear of the plough and the ground covered when sufficient use of the new plough has been made to reveal this information.

NOTES AND COMMENTS.

By the Editor.

The 4th Annual General Meeting of the Union.

The 4th Annual General Meeting of the Union was held in the month of November 1921. It was a three-day session as heretofore and the first two days *viz.*, 7th and 8th were devoted to discussions and the reading of papers, etc., while the third day, the 9th, was a field day spent on the Hebbal Farm. The meeting was largely attended by many members from the districts, while the departmental staff also mustered strong.

It is matter for great satisfaction that so many non-official gentlemen — important and earnest agriculturists—found it convenient to be present on the occasion and to take part in the discussions and in the demonstrations arranged for their benefit on the Farm. It is plain beyond doubt that we are growing fast.

The membership has increased ; and what is more, the practical interest being taken in the work of the Union is also growing in volume. Accounts of the doings of the Union and of the profitable time members spent on the Hebbal Farm have been taken back to their villages by the members who attended and we were pleased indeed to hear in some of these villages, other agriculturists and members who were unable to attend feeling keen regret at their not having done so.

As the Proceedings of the meeting appear *in extenso* elsewhere in this number of the Journal we make no reference to any of the subjects dealt with. The papers read are as usual being published in the Journal.

* * * * * *

Tractor Laws in the U.S.A.

In regard to the use of tractors in our State it has been pointed out on more than one occasion in this Journal that the lack of a prompt supply of spare parts has been causing great inconvenience to such of our large farmers as have been enterprising enough to purchase tractor outfits, and has, at the same time, been acting as a check upon any extended use of these machines in the country. One would have

thought that such a situation would either not arise in the countries where they are manufactured and are largely in use, or if it did arise, would not be serious. But from the fact that one State at least in the U. S. A. has thought it necessary to pass a law imposing certain conditions upon the tractor trade calculated to safeguard users against such troubles shows that a similar state of affairs does prevail elsewhere also. We refer to the State of Nebraska, where a law known as the Nebraska Tractor Law has been passed and been operating since the year 1919, the provisions of which are as summarised below :

1. That a stock tractor of each model sold in the State shall be tested and passed upon by a Board of three Engineers under the State University management.
2. That tractors shall be sold only under a permit, which will be issued only after a stock model of the tractor is tested at the University and the performance compared against the claims made for it by the makers.
3. That a service station with a full supply of replacement parts of each model of tractor shall be maintained within the confines of the State and within reasonable shipping distance of customers.

It is worthy of note how well the State looks after the interests of the farmers.

The report (Bulletin No. 117 of 1921, of the Nebraska Agricultural and Experimental Station) from which the above is extracted, relates to the testing of sixty-nine different makes of tractors, the tests themselves being carried out under accurate, one may almost call them, laboratory conditions.

* * * * * *

Agricultural Associations in Bengal.

We learn from the last annual report of the Bengal Department of Agriculture that considerable progress has been made in the formation of village agricultural associations. Two hundred associations are said to have been started in the Burdwan Division alone and over 100 in Eastern Bengal. It is also proposed to group them together for co-operative work and organize them as co-operative societies. We read also of some novel lines of work entrusted to these bodies such as the re-excavation of old tanks and the construction of bunds,

There is evidently a disposition to hasten the pace in the formation of such societies. If experience here and in Madras is any guide, it is one of the most difficult things to organize a really useful association with the elements of permanency in it. Associations in this part of the country have in the past come into existence to languish for a time and then be forgotten. Some indeed have never been anything more than a name. The path of agricultural progress may in fact be said to be strewn with the graves of these institutions thick as autumn leaves. It is not, in our opinion, because they were not needed and that there was no useful work they could take part in, in advancing the cause of agricultural improvement. There is much they could do, provided they *follow* and not *precede* a certain measure of experimental and demonstration work accomplished by the local Department of Agriculture which should itself be sufficiently well-manned to be able to conduct a large amount of what is called district work. The Department should be in a position to recommend really promising lines of work and to closely watch, advise and supervise the work of the association. Where matters have not progressed thus far it will be only courting certain failure to attempt to start associations.

* * * * * *

A Committee on Cattle Improvement.

The Government of Bombay have, we read, appointed a Committee consisting of certain leading non-officials and of officials selected from the Agricultural, Veterinary and Forest departments, to consider and advise the Government on the question of the maintenance and improvement of the existing breeds of cattle both as milch and as work animals and of the improvement and expansion of the fodder supply of the Bombay Presidency. The Committee is presided over by Rao Bahadur G. K. Chitale, M. L. C., of Bombay and has the Deputy Director of Animal Breeding as Secretary. The Committee is to hold its meetings in Poona and is authorized to consult all that may be able to furnish useful information.

Mysore has close affinities with Southern Bombay, and such recommendations as they may make for this tract of country cannot fail to be of value to us.

The question of fodder supply is very acute in Bombay, as it is, more or less, among us also. In the matter of fodder reserves,

fodder depots, utilization of prickly pear and of other coarse fodders, the supply of baled hay from Government fodder farms and so on, the Bombay Department has shown considerable interest in this branch of the work. Any large schemes of general application that the Committee may be able to suggest should be of great value both inside and outside of Bombay.

* * * * * *

The Government of Madras and the Consolidation of Holdings.

The consolidation of holdings is one of those ever-green subjects that occupy attention in all schemes of agricultural improvement discussed in this country. It cannot but be so, for no feature of the agriculture of this country hits you in the face, so to speak, as the small holdings and the scattered and distant fields of which they are composed. The evil is admitted on all hands as one deserving of early remedy; the case for a restripping or grouping together has been very ably put forward by many writers and it is hardly necessary for us to refer to any of these weighty arguments. In Bombay the matter came up before the Legislative Council where one of the members sought the help of legislation to secure the end. In Mysore it may be remembered that the matter was discussed at great length in the Agricultural Committee of the Economic Conference and progressed so far that a trial of such restripping was resolved upon in some suitable village or group of villages as an experimental measure. The fortunate village or group of villages has evidently not been discovered, for we are not aware of any place where in accordance with the resolution work has been taken up.

The Government of Madras, so far as we know, is the only administration which was bold enough to order that a practical beginning should be made, at least to realize to what extent it would in practice be possible. For this purpose the Government ordered that this matter should be given a trial during the progress of revenue settlement and selected the district of Tinnevelly for the purpose where a resettlement was being conducted by Mr. G. F. Paddison. Before the grant of 'pattas' it was ordered that scattered holdings should as far as possible be grouped together and each man's title-deed should be for a holding of which all the constituent fields will lie together in one single block. The method recommended was of

course purely persuasion, so that raiyats could by mutual consent agree to an exchange of fields so as to produce the desired result.

The Settlement Officer tried to carry out these orders and has failed.

He remarks, however, that it is a task which can only be attempted with any prospect of success by an officer of status sufficiently high to inspire confidence and in fact make himself a regular missionary preaching the benefits of consolidation of fragmented holdings.

The Government of Madras in passing orders on this report have thought fit not only to dot the i's and cross the t's of their Settlement Officer's report but have also adduced further circumstances which make it in their opinion not only impossible but highly undesirable to embark upon the scheme. With so many nails driven fast home into its coffin, this much discussed subject may be reckoned dead, till the miracle of a resurrection comes about. It is a pity. The report of the Settlement Officer gave some room for thinking that the difficulties are not insurmountable and that it was a question of entrusting it to a different and more suitable organization. But the Government have hastened to dispel this hope, as much as to say, "no more of these impossible fads, they are bound to fail." We quote below the arguments of the Government upon which they base their conclusions :—

"The Government consider that, so far as this Presidency is concerned, the problem is beset with difficulties and that it is not capable of such an easy solution as might appear at first sight. The proposal seems contrary to the traditions and practices of the smaller holders of land. There are again cases in which sub-division is inevitable, *e.g.*, where part of a holding is transferred or a joint-holding is divided among the joint pattadars. Refusal to sub-divide in such cases will result in hampering dealings in land and merely increases confusion between real and nominal owners. Legislation in such matters is out of the question ; and any attempt to discourage sub-division below a certain limit by the levy of a prohibitive fee or otherwise is likely to be resented. The Government consider that so long as sub-divisions have to go on for one reason or another any

attempt at consolidation of existing fragmental holdings is bound to fail and that it will serve no useful purpose to allow the time of settlement officers to be wasted over it."

As far as Madras is concerned, the scheme is no doubt dead, but those of us who believe in *Karma* and reincarnation may find solace in the hope that it will reincarnate on a more fertile soil with the experience of its first incarnation to strengthen it to withstand adverse environments.

* * * * * *

Diseases of the Potato.

The cultivation of potatoes in Mysore has many excellent features to recommend it for wider adoption. The climate of the State is very well suited to its cultivation, an advantage which the State possesses over the plains of South India. This one advantage alone is worth exploiting to the fullest extent possible. Being only a three months crop it permits a quick turnover of money, and has the superiority over many other vegetable crops in that it can be kept. It is further a very profitable crop to grow as a net return of about Rs. 100 an acre and often more when prices rule even moderately high, can be obtained.

The methods of cultivation too are quite well understood and the area under the crop is already about 10,000 acres. There is always a good demand for seed potatoes and it will be quite possible to extend the cultivation, were it not for the fact that the cultivation is at the present time attended with some risk due to the diseases to which the crop is subject. The chief disease so far as this State is concerned is the "Ring" disease; and it is chiefly owing to the difficulty of getting seed which can be guaranteed to be disease-free that one is not in a position to push forward the cultivation as much as one would otherwise wish.

The Mysore Department of Agriculture can take credit for being the very first in India to carry out accurate investigations into the nature of this disease and the means of its spread; for prior to Dr. Coleman's work on the subject in 1909, little was known about it, and what little was known and written about was mostly moonshine. Dr. Coleman established the fact that the disease was bacterial in nature, that diseased seed setts always gave rise to diseased plants,

that the soil in which such plants grew became infected, and such infected soil and diseased seed were the chief causes of the disease. These facts once established had the strange effect of almost paralysing one's efforts in the direction of extending the cultivation; for since the disease is prevalent more or less throughout the potato-growing tracts of the State, the soil in these areas should be deemed infected, and it will be impossible to guarantee locally grown seed as disease-free. Experience with outside seed selected and certified as disease-free seed has also been disastrous and there is, as the result of these facts, such a spirit of confirmed pessimism in regard to this matter that is certainly not good for the interests involved. We would like to see the investigations taken up from where they were left and pursued in the light of the experience of the last thirteen years.

We are led to make these observations on a perusal of Bulletin No. 102 of the Bombay Department of Agriculture in which Dr. Mann and his assistants bring together in a collected form papers already published by them from time to time relating to the work done by them on several aspects of potato cultivation notably the diseases of the potato. We would draw special attention to the claims made by them that soil infection in regard to the Ring disease is a matter of little moment as the soil becomes free if there is no potato on the land for a period of six months and secondly, that disease-free seed can be raised within about a couple of years by repeated selection alone. The first of these claims at least is at variance with conclusions reached here, and to this point we referred once already in the pages of the Journal (*Vide* p. 78, Vol. I). Another point worth noting is the large prevalence of different forms of 'Fusarium,' symptoms of which on the field as well as the appearance of the cut surfaces of the affected tubers are such as may be mistaken for Ring disease by the casual observer. In view of the great scope there exists for putting a highly profitable crop in the hands of our raiyats by extending the cultivation of the potato, and in the light of the circumstances referred to above, we should be glad that further research work be taken up as early as possible.

Report of the Indian Sugar Committee.

The report of the Indian Sugar Committee to which those of us interested in this important question have for some time been looking forward eagerly has been published, we may add, with much commendable promptitude. The report is naturally replete with information on all aspects of this question, the terms of reference themselves having been very wide and comprehensive. The Committee traversed practically every important cane tract of India, visited all the experiment stations, all the factories of any importance, examined about 222 witnesses in all and finally visited Java to study and examine on the spot the sugar industry of that country with its all but perfect system of sugarcane cultivation and sugar manufacture. The large mass of information thus collected has been sifted and summarised, and presented with the Committee's conclusions and recommendations thereon in such a clear, succinct and readable form that it is hardly capable of improvement. The ground covered is however so extensive that it would be neither possible nor fair to our readers to attempt in this brief review to refer or comment upon even all the more important among the recommendations. We have therefore decided to publish among our "Selections" not only such recommendations as are general in their application but also such other extracts from the body of the report itself as we consider may be of interest to our readers. The first instalment of these appears accordingly in our "Selections" in the current number itself.

To refer now to the main conclusions: The situation broadly stated is that India has been year by year importing a steadily increasing quantity of sugar from foreign countries; during the four years 1910—1914, immediately prior to the War, the imports reached the huge figure of 723,915 tons per year in the average, valued at 12·71 crores of rupees. These naturally decreased during the War, but taking the eight year period 1910–1918 the yearly average is reckoned as 628,000 tons valued at prices current in 1920 at 63 crores of rupees! Is it not possible to stem this tide of imports by producing this quantity in whole or in part within the country itself? That is the problem. We are glad to note the tone of optimism in the Committee's answer to this question when they state

it as their opinion that it should be perfectly practicable to produce the *whole* of this in India itself.

The recommendations made by the Committee for the realization of this ideal are many and cover a wide field but three of them are commended for immediate action and these are : (1) the establishment by the Government of a large up-to-date sugar factory, (2) the constitution of a Sugar Board and a Research Institute, and (3) the opening of a Sugar School for the training of students in Sugar Technology.

The establishment of a sugar factory either wholly managed as a Government concern or as a private concern, but largely subsidised by Government, has in fact been urged many times in the past, as in the case of several other industries where the Government has been urged to start pioneer or experimental factories. Being totally opposed to the policy of Government such suggestions have been little heeded. Whether in the present instance an exception will be made will of course be hard to foretell. The Committee however suggest that in case the Government should be unable to provide the entire capital themselves, they should guarantee a 7 % interest on a special debenture loan to be raised for this purpose. Of course once the Government concedes the principle of some form of substantial State aid to industry the particular form such aid should take will not be difficult to decide.

The advantage to the sugar industry of such a step is too obvious to need any special mention. The factory proposed is one of the capacity of crushing 1,000 tons of cane per day over a season of 100 days ; the total capital cost is estimated at Rs. 59 lakhs and the net profit at 26 % when the price of sugar is Rs. 20 per standard maund and 9% with the price of sugar at Rs. 12 per maund. The Committee recommend that the factory should be located in the Punjab. The factory in addition to demonstrating the possibilities of the great cane-growing tracts of Upper India will serve as a model to all factories in India, as a vehicle for carrying out experimental work of value and, in conjunction with the Sugar School, as training ground for the men who look to the industry for a career. It is however to be run as a thoroughly commercial concern, which we are afraid will be found hard to reconcile with the other objects specified.

The Committee recommend secondly, the establishment of an Imperial Sugar Research Institute on the model of the Research Institute at Pusa but solely devoted to research work relating to the sugar industry. The Central Institute would in addition to its own research work also control directly a network of Sugarcane Experiment Stations to be established in all the Provinces. In fact the Committee would apparently separate practically all work on the sugarcane and other sugar crops from the scope of the present Departments of Agriculture. The cost of the Research Institute taken together with the Sugar School and the various provincial sub-stations is estimated at 35½ lakhs of rupees initial and Rs. 12 lakhs recurring. This amount is to be found almost solely by the Government, but as time goes on, the present sugar factories and those which may be started hereafter are to contribute by means of a voluntary levy calculated at so much per ton of sugar manufactured.

The third recommendation relates to the establishment of a Sugar School on the model of the Audabon Sugar School in Lousiana or of the similar school in Hawaii. The school which will provide a 2½ years' course in Sugar Agriculture, Chemistry, and Engineering will be open to only such men as have taken the first two years' course in a College of Agriculture or Engineering. Instruction in the school and in the school farm and factory will be supplemented by a course of practical work in the Government or some large private factory. The school is recommended to be affiliated to a University, which would award the B.Sc. degree in this subject.

The crown and controlling authority of this structure is the Indian Sugar Board comprised of both officials and non-officials which will attend to all matters tending to the advancement of the sugar industry. The Board will control the policy of the Research Institute, administer the funds thereof, would advise both the Central and the Local Governments on matters affecting the Sugar Industry and be consulted by them on matters of legislation on sugar matters.

This many-sided and complex organization, itself a combination of the best features of similar organizations in the great sugar producing countries of the world, cannot be deemed too much, when considered in the abstract, for a country like India. To what extent the lack of such organizations has hindered the starting of sugar

factories in this country will however be a measure of their immediate need for bringing into being any large sugar factories.

The Committee have gone very fully into the question of the acquisition of land for cane plantations, into questions of Government assistance, of licensing factories, enhanced protective duties and so on. It has on the whole sternly set its face against all manner of artificial aids especially such as may involve coercion, compulsion or other forms of restriction of individual freedom. The Committee look forward to a natural growth of the industry fostered only to the extent possible by the organization they have indicated, but otherwise solving its own difficulties as they arise in a manner satisfactory to all the parties concerned, *viz.*, the grower, manufacturer and merchant. Such a process will be very slow indeed, and not likely to satisfy those who would hasten the pace. As a matter of fact, one of the members of the Committee, *viz.*, Mr. P. J. Padshah of Messrs. Tata Sons & Co., is strongly in favour of direct Government action in the compulsory acquisition of land and other forms of assistance and makes out a very strong case which the Committee are not able to agree to, only on grounds of general policy. On such an important matter there may be room for much difference of opinion, but the experience of the Committee who have traversed all parts of India and studied the varying conditions is entitled to the greatest respect.

Coming to the Committee's conclusions with regard to Mysore itself — which are reprinted in full in our "Selections"— we notice the tone of high commendation in which the Committee speak of the work of the Agricultural Department on sugarcane. The organization, efficiency, and the volume of the work, the lines on which the work is conducted, the close chemical control, all come in for praise in more places than one in the report and the Department has reason to feel proud of thus being singled out. The prospects of growing cane on a large scale in our State, the Committee consider hopeful though the area deemed promising by them is the neighbourhood of Goribidnur, about the suitability of which one would be somewhat sceptical. Development under the Cauvery channels is, in their opinion, not likely to be rapid, and under the Vanivilasa Sagara (Marikanive) also difficult; the Sulekere tank however is deemed promising,

though only for purposes of a large jaggery factory and not a sugar factory. Drainage, commercial manures, etc., are also touched upon but we would refer our readers to the report itself for further information.

* * * * * *

Personal.

From the commencement of the current year, that is, from the next number onwards the editorship of the Journal changes hands. As out-going Editor we wish to express our grateful thanks to all our contributors who have helped to make the Journal what it is, during these first three years of its career. The personnel of the Editorial Board appears elsewhere in this number.

SELECTIONS.

I

Report of the Indian Sugar Committee.

Summary of Conclusions and Recommendations relating to Mysore.

(1) The chief obstacle to extension of cane in Mysore is the need for perennial irrigation.

(2) Extension under the Cauvery dam project is improbable until the second stage of the project is carried out, and even then is not likely to be rapid.

(3) The limited perennial water supply, shortage of labour and salinity in the soil are obstacles to extension under the Marikanive reservoir.

(4) The reclamation of saline lands under this reservoir should be undertaken and an attempt made to combine it with a scheme of intensive cultivation on the lines proposed for the Bombay Deccan.

(5) The Sulekere tank area is probably too small for development as a central factory area, but the possibilities of introducing small power *gur* factories there should be investigated.

(6) The installation of power pumping plants should be carried out either by or in close consultation with the Agricultural Department.

(7) A factory industry must be organized, if any material extension is to be effected and the bright agricultural outlook justifies special efforts to this end.

(8) The Goribidnur taluk of the Kolar district appears a favourable tract for development on these lines.

(9) The Malnad and some of the State's Date palm groves may provide equally suitable areas for such development.

(10) The possibility of concentrating and improving sources of irrigation in such tracts should be investigated, and suitable areas should be reserved for allotment as sugar plantations.

(11) If cane-growing on a plantation scale is organized in any locality, the transfer of cane research work to that locality should be considered

(12) Limitation of supplies of commercial manures is an important factor in the conduct of manurial experiments.

(13) Problems of drainage, water requirements and rotations remain to be dealt with.

(14) Withdrawal of the stipulation that the Babbur farm must run at a profit is recommended.

II

Cost of Production Studies.

The value and importance of such studies are set forth clearly in the report of the reorganization committee, as follows :—

Cost of production studies are of value to the individual farmer and, at the same time, are helpful in ascertaining the economic status of farming as an industry.

From the standpoint of the individual farmer the primary purposes are :—

(1) To record the details of the farm business for reference.

(2) To give an insight into the elements and inter-relations of the different farm activities.

(3) To furnish information that may enable the farmer to reduce costs or otherwise increase profits.

(4) To make possible a comparison of the profitableness of the different enterprises and combinations of enterprises.

The records secured by cost of production studies give data for analysing the farm business, and thus are of fundamental importance in the whole programme of agricultural research and education. The results of such studies on a number of farms where a given type of farming is practised are useful not only to the farmers from whose farms the results were obtained, but are of value in showing other farmers how to improve their methods.

From the standpoint of the public, cost of production studies provide the facts which give a basis for intelligent judgment upon the probable effects of any given legislation or other public activity upon the farmer as a producer and as a citizen. Cost of production studies are therefore one of the means of providing the basic facts needed by legislators and price commissions in comparing the profits of competing lines of production and estimating necessary price.— *Year-book of the Department of Agriculture, U. S. A.*, 1919.

III

A Few Facts about Seeds.

A good many people make the mistake of planting small garden seeds too deeply. Consideration is not given to the fact that the weeds which grow so luxuriantly scatter their seeds over the surface of the ground. They are then beaten in by rains, and covered slightly with soil through frost action, but the great majority of them are only barely covered. It seems reasonable then that small vegetables and flower seeds should not be put down deep in the soil, for they germinate and grow under exactly the same conditions and in accordance with the same universal plan as do weed seeds.

Several recommendations have been given as to the depth seeds should be covered, such as two, three or four times the diameter of the seed. These rules may be of some value when planting in the greenhouse, or in the hot-bed, where the temperature and nature of the soil are under full control. When planting outdoors, however, one should be guided by the character of the soil, moisture available, and the temperature. Small seeds planted in the surface layer of a light soil will not germinate satisfactorily, because there will not be sufficient moisture. In light, sandy soil, small seeds should be planted deeper where they will come in contact with moisture. Light soils are usually warm to a considerable depth and there will be no danger of the air not permeating deep enough to come in contact with them.

It is folly to plant small seeds deeply in heavy clay soils, for they are liable to rot rather than germinate. Heavy soils are more inclined to be cool, and while there may be plenty of moisture available it will be too cold for germination.

During a moist season one would plant small seeds near the surface on all kinds of soil, but when it is very dry they should be planted more deeply. Early spring plantings should be shallower than those planted, say, during the month of June. The soil will be warmer in June and more likely to dry out on the surface.

Some of the smaller seeds, such as celery or onions, need only to be pressed into the soil, while beets might well be put down from a half to three quarters of an inch, and larger seeds, such as peas, beans, etc., do very well when planted two or three inches deep. No general rule can be laid down regarding the depth of planting, and we have discussed the problem here so that any one planting seeds may be guided by the conditions existing at the time.—*The Agricultural News.*

IV

Dormancy in Seeds.

The problem of dormancy in seeds is probably one of the most perplexing in the whole of plant physiology. It is common knowledge that many seeds, after detachment from the parent plant, pass through a period of rest, during which they fail to germinate even under the most favourable conditions of moisture, oxygen supply and temperature. Such seeds can often endure the withdrawal of water and dry up, remaining alive sometimes for many years. It is obvious that such seeds cannot be described as dead, since they may retain their capacity for germination for several years. A seed may fail to germinate immediately after harvesting, owing to a state of dormancy in the embryo itself or because of the nature of the seed-coats. The dormancy in the embryo is due to the need of further ripening processes, which may conveniently be designated after-ripening. More usually, however, the dormancy is due to the seed coats, which may prevent germination by inhibiting the absorption of water, or mechanically preventing the expansion of the embryo. The seed-coats may also prevent germination by interfering with the absorption of water, or the elimination of carbon dioxide. Soaking in acids is often effective in forcing such seeds, either through modifying the colloids of the seed-coats or changing the reaction of the embryo. Other forcing agents which are often successful in shortening the period of dormancy are freezing, exposure to high temperatures and desiccation. It is interesting to note that Johnson grass (*Holcus halepensis*) germinates best after exposure to alternating temperatures, whereas the closely allied Sudan grass (*Holcus halepensis sudanensis*) requires a constant temperature ; while removing the pulp from camphor seeds may hasten germination of these seeds by two weeks.

Some observations of Kondo on the after-ripening of rice may be of interest. The rice was harvested at intervals in its growth designated as the milk, the yellow ripe, the fully ripe and the dead ripe stages. Seed harvested in the milk stage was found viable, but to be lacking in vigour. Storage for about 15 days after preliminary drying, or for a month without drying, resulted in quite satisfactory germination. The germination of the yellow ripe grain was also markedly improved after from one to three months' storage. Fully ripened grain germinated quite well immediately after harvest, but showed greater viability a month later. Dead ripe grain germinated very readily immediately after harvest and was not materially benefited by storage. Grain stored in a dry condition completed the ripening processes much more rapidly than that

stored without preliminary drying, but the latter showed greater viability and vigour. The storage of the unripe grain in the panicle was found to be detrimental in many cases to after-ripening.

Information of this nature is clearly of the greatest value ; it is to be regretted that more information is not available concerning the behaviour of West Indian Seeds. The possibility should not be overlooked, however, that some of the seeds of these islands may pass through a period of secondary dormancy. That is to say, the seed may be capable of germination immediately after harvesting, but may subsequently pass into a quiescent period, after which it may again be viable. The loss of vitality in seeds is of course a matter of the greatest importance. Rubber seeds, for instance, very rapidly lose their viability, thus rendering their transport from one country to another extremely precarious.

—*The Agricultural News.*

V

The Cultivation of Sugarcane in Java as recorded by the Indian Sugar Committee.

Relationship of Factories to Landholders.

(*a*) *Legal provisions affecting leases.*—The success of the sugar industry in Java is undoubtedly largely due to the possession by the factories of entire agricultural control over the leased lands which supply them with cane. The arrangements between the factories and the landholders, are, in fact, a survival of the culture system introduced about 1833 by the Governor-General, Van der Bosch, though the compulsion underlying that system has long been eliminated. No person who is not a native of Java can acquire land outright from a native ; and the factory lands are therefore held under leases, the terms of which are regulated by an Ordinance of the Netherlands India Government, Staatsblad No. 88 of 1918, which has now superseded the previous regulations embodied in Staatsblad No. 240 of 1900. Its main provisions may be briefly summarized. Leases for longer than 21½ years are forbidden. When the lease is for a period of more than 3½ years the factory has to pay the minimum rent fixed by the Ordinance Each factory operates under a license from the Government of Netherlands India which restricts its concession to a specified number of villages within which it is permitted to take up for cane a specified total area, provided that in no village or hamlet may the fraction of the total cultivated area leased in any one year exceed one-third. Subject to these limits, the factory makes its own arrangements with the villagers. In doing so it utilizes in tracts in which the communal land tenure obtains the good offices

of the village headman, an official of great influence in his village who often receives a small commission in proportion to the area obtained. The terms of the lease are scrutinised by a controlleur, an officer whose status corresponds roughly to that of an Assistant Collector in India, before whom both parties to the leases are bound to appear in person. Registration of the lease is refused unless he is satisfied that it has been entered into voluntarily, but an appeal lies to the Assistant Resident who corresponds to a Collector in India, from his decision.

(*b*) *Rents, premia and advances*.—Until 1918 the factory could lease land at any rates agreed upon between it and the commune or individual landholder. Under the Ordinance of 1918 minimum rates have been fixed by the Government in respect of those lands only which have been classified at Settlement as rice lands, the rates being based on the assumed net profit obtainable from the one rice crop and two unirrigated crops which might have been grown during the 18 months for which the land is occupied for cane. To this is added an amount which varies from 2 to 7½ *guilders** per *bouw* for restoring the land to its original condition. The value of rice taken for the purpose of these calculations is the average market price of the previous 10 years. At the time the Ordinance was passed these rates were above those prevailing, but owing to the great rise in the price of sugar and of rice during the last two years and its reaction on rents, they are now in many cases considerably below those which are actually paid. The minimum rates fixed by Government are subject to revision every five years. If the lease is for less than two years, an advance can be given by the factory, but not more than 15 months before possession is taken of the land. For leases of 2 to 3½ years' duration an advance may be given to an amount not higher than the rent for one planting period; but it may not be given more than 15 months before the 1st January of the year in which possession will be taken of the land. No advance may be made, but payment of premium is permitted if the lease is for more than 3½ years. The minimum rent of land per bouw is now about 60 guilders per annum or 90 guilders for the cane season. The land revenue, which averages about seven guilders per bouw for rice land but is subject to revision every ten years, is paid by the villager who leases the lands.

(*c*) *The communal tenure and its effect*.—It should be mentioned that throughout Java, but more especially in the Eastern Regencies,

* The standard value of the guilder is 1*s*. 8*d*. or 5-6ths of the present standard value of the rupee. In view of the depreciation of the rupee, however, we have taken the guilder throughout our Report as the exact equivalent in value of the rupee.
One bouw = 1¾ acres.

the land in many villages is communal property. In most cases this means nothing more than that the land is held in individual ownership but cannot be transferred permanently or temporarily to any one but a member of the village community, without the consent of at least two-thirds of all the members. In some villages, however, redistribution is made annually or at longer intervals by the whole village, theoretically with reference to the capacity of each family in the village to cultivate the area allotted to it. Disputes are settled by the Controlleur. It would appear from the statistics published by the Netherlands India Government that communal property is disappearing and that this tendency is particularly marked in villages of which the land has hitherto been shared out afresh every year. In such villages the tendency now is for the land to be repartitioned biennially or not at all, in other words, even in communal villages the greater part of the land continues in the possession of the same persons, although the ultimate communal ownership remains. The communal tenure in villages where redistribution is still practised has the advantage from the point of view of the factory that it enables the village community to provide elsewhere for a recalcitrant villager who is unwilling to lease his land to a factory and would thus prevent it from cultivating a compact block of land. The average holding in Java is less than one bouw, so that the agreement with each landholder is for less than one-third of a bouw per year. This means that, but for the communal system, a factory leasing an area of 1,200 bouws, which is the average, would have to enter into more than 3,600 separate agreements. In actual fact, where the communal system prevails, as it does in the tracts in which most of the factories are operating, the leased area of each village is taken up in a compact block comprising the shares of it may be as many as 60 individual landholders. The agreements of each village are embodied in one list, so that the factory in reality enters into some 60 agreements only.

(*d*) *Period of occupation by the factory.*— An important feature of the Java system is that, although the land is leased for lengthy periods, it is actually only occupied by the factory during the period required for cane-growing, *i.e.*, from 14 to 18 months. As soon as the cane is cut the commune or the individual landholder resumes possession. Under the Ordinance of 1918 the factory is required to hand the land back in the same condition in which it was taken over, *i.e.*, the land should be cleared and levelled and the boundary marks of the plots restored ; but, as in practice this is done by the villagers themselves,

the Ordinance prescribes that in the minimum rate shall be included a fixed amount for this purpose. This varies according to local circumstances, as already stated from 2 to 7½ guilders per bouw. Competition between existing factories for land is impossible under the Government regulations, as no new factory can be erected without a license from Government. This has long been refused in West Java, and for some time past no new factories have been permitted in Central or Eastern Java in order to prevent any further reduction of the area under food crops. *(To be continued).*

XIII

Coffee Pruning in Central America.

Although there are two methods of training the tree, the process of pruning is more or less the same in Guatemala and Costa Rica. In Costa Rica the capping system is carried out : the practice is to cut off the top part of the young plant when the latter is about 12 inches to 15 inches high. This is done about three to four months after they are planted out into the field and have recovered from the transplanting. Some planters, however, advocate capping the same day as the plants are transplanted, if there are two or more pairs of primaries on the plant. The reason is to lessen the function of the roots which supply water to the leaves and food to the plant. Two shoots will grow below the cap from opposite sides of the internode : the buds make their appearance in the axils of the leaves, thus two vertical stems will be capped when about twenty-four inches in height, and the process can again be repeated according to the height of the tree desired. The result is a four-stemmed tree with numerous fruit-bearing lateral branches. When the tree commences to bear a fair average crop, the weight of the berries bends the branches outwards, and this facilitates the picking.

To understand the system of pruning and handling that is carried out it must be borne in mind that the crop is obtained off the primaries only.

The pruning commences after the crop is gathered. Any primary which has become weak and whippy is cut away flush to the main stem; primaries nearest to the ground are always the first to be cut off. In time there will be a gap between the ground and the upper primaries, and at this stage, a shoot is allowed to grow from the mother trunk as near to the ground as possible. The laterals from the shoot will then take the place of the laterals which have been cut off from the old trunk. This shoot is capped by the same process as if it were a new tree being trained. The result is, formation of old wood is avoided, and new wood is

constantly being trained. The same applies to any upright branch which becomes unhealthy; it is cut away and a shoot is trained to take its place.

"Handling" and "Centering" are carried out as many times as possible — three to four times a year. When handling, all secondaries and tertiaries are taken away. "Centering" is taking off all superfluous suckers growing from the main stem. Should secondaries and tertiaries be left by this system of pruning, the trees would have such a thick growth that it would be impossible to cope with diseases, and spraying could not be properly carried out; also there would not be sufficient air and light passing through the trees, thereby diminishing the crop considerably.

Double Head System.

This system of training is similar to the first described, only instead of having a four-stemmed tree, only two stems were trained. The idea was to have a tree trained on the capping system and pruned on the lines carried in East Africa, the Blue Mountains, India, etc., but it was found that if good yields were obtained, it did not become popular owing to the extra attention it required; also the general opinion with regard to pruning is against the retention of secondaries and tertiaries as it causes an unnatural growth.

Some planters are of the opinion that the system of pruning carried out in India and East Africa is injurious to the coffee tree, as the growth becomes abnormal and necessitates severe pruning and encourages the attack of fungoid diseases.

In Central America it is the custom when stumping or cutting off branches to use a sharp cutlass, the blade of which is about 22 inches long. The pruners become expert at this work, the cuts made being much cleaner and the work is carried out more quickly than when a saw is used.

Description of Branches of Coffee.

1. "Upright Branches. Natal axillary branches not producing florescent branches, serving as equivalents of the main stem."

2. "Lateral Branches. Natal axillary branches attached to the base of the internodes of the main stem or of the upright branches. Lateral branches produce leaves, florescent branches and secondary laterals but are unable to replace the main stem."

3. "Secondary lateral branches. Adventitious branches arising from axillary buds of the lateral branches. They are florescent branches pushed into vegetative growth by severe pruning. In form and function they agree with the lateral branches."

4. "Florescent branches. Natal and adventitious co-axillary branches borne in clusters on lateral and secondary lateral branches."

The following article was published in a bulletin by the United States Department of Agriculture on the relation of Branch Dimorphism to the pruning of coffee :—

"The habits of growth and cultural requirements of coffee, and "especially the principle of the art of pruning cannot be clearly un- "derstood without the recognition of the two kinds of branches. "Planters who reason in a general way without taking into account "the dimorphism of the branches, often suppose that the pruning "back of the uprights at the growing ends will cause them to send out "new lateral fruiting branches lower down. This is a mistake, for "new lateral branches are found only on young growing uprights and "then only two of the laterals from each joint of the upright.

"Additional development of lateral branches is to be obtained "from mature uprights only by forcing the primary laterals to send "out secondary laterals. If the primary laterals have been cut off "secondary laterals can be formed. Severe cutting back of the main "stem or upright branches is usual as a means of forcing more vege- "tative growth in the lateral branches.

"If the pruning is too slight, it may have the effect of merely "causing the primary laterals to elongate without forcing them "to send out secondary lateral branches ; for it is not a normal "habit of a coffee tree to produce branches from the laterals. Left "to itself without pruning, coffee usually produces only simple la- "terals, and forms new lateral growth only through the medium of "new uprights. When all the axillary buds of the main stem have "been eradicated, no new uprights can be formed. If the tree con- "tinues to thrive, it spreads out on the ground as a tangled mass of "slender decumbent lateral branches.

"It is the custom of the planters in Jamaica, according to Mr. "P. V. Collins of the Bureau of Plant Industry, to pull off the uprights "instead of cutting them, that this prevents the growth of any more "uprights. It is easy to understand that additional uprights may "develop from buds of short basal joints of uprights that have been "cut off ; but this would not be the case with the uprights that are "pulled out.

"If the fertility of a plantation is to be maintained, resort must "be had to some form of pruning in order to continue the formation "of healthy new wood on which good fruit can be borne. Old trees

"that are not pruned tend to produce slender branches, narrow leaves "and very small fruit. New wood can be obtained by allowing new "uprights to develop or by preventing the growth of the uprights "and forcing the laterals to branch. The use of uprights or the "rejection afford a fundamental distinction between the several differ- "ent systems of pruning coffee."

"AGOBIADA."

In Guatemala the capping system is still carried out by many of the planters, but the new method known as "Agobiada" which literally means "bent over" has been in operation for fifteen years and is becoming very popular. The object of this method is to avoid capping so as not to encourage the growth of secondaries. It might be mentioned here that although capping is carried out in Costa Rica and secondaries are not desired, this system encourages growth on the laterals.

Planters who have adopted "Agobiada" claim that the chief advantages it has over capping are :—

1. It requires less labour for pruning and handling.
2. The tree is more pliable and easily bent, hence extra facility in gathering the crop.
3. The formation of old wood is avoided, so there is less chance of the dreaded disease *Phthora vastatrix* attacking old trunk stems.

The saplings are planted in the field, and after having recovered from the transplanting, a number of hooked stakes are collected about two feet in length, one stake is required for each plant. The coffee plant is bent down to the ground and fastened in that position by driving the stake into the soil. The position of the stake will depend on the size of the coffee plant. The plant is left in this bent position until numerous shoots grow along the stem. Three of the best shoots are selected as far apart as possible and the rest of the suckers stripped off. When the selected shoots have grown about twelve inches, the stake should be taken away from the old stem. It will remain in a bending position, but this does not matter.

If this stem does not thrive well another sucker can be trained and the old stem cut away. In rich soils it is customary to have four stems but in poor soils three are preferable. The only pruning that is done is to take off all secondaries and suckers, and, when an upright branch becomes unhealthy, it is cut away and a new shoot chosen to take its place. No capping or tapping is ever done when this method is carried out ; the trees are left to grow any height, the stems will bend outwards by the weight of the crop. This allows plenty of air and light into the tree.

After each crop, all weak and whippy primaries are cut away. One often sees on the older trees the crop being on the upper branches only, at this stage new shoots are trained to take their place, and the old wood cut off at the end of the crop, the result being the formation of old wood is avoided.

One of the strongest points in favour of this system is that it does not require intelligent labour to do this work, and it is simpler than the system carried out on single stem trees in Jamaica, India and East Africa, etc. A plantation of about 1,000 acres would require the same amount of labour as 300 acres of coffee pruned on the Indian system, so that large areas of coffee can be more easily handled on "Agobiada" lines.

In the Alto Vera Paz district of Guatemala the Indian system of pruning coffee was tried and given up, as it was found that it required unlimited labour, and great difficulty was experienced in teaching the labourers the different stages of pruning.

The Costa Rica labourers are more intelligent than the Indians of Guatemala, so that Agobiada will no doubt take the place of capping in all the districts of Guatemala.

In coffee culture there can be few hard and fast rules ; systems which may prove justifiable and advantageous in one coffee growing country may be unsuitable in another, or even destructive, so greatly do the habits of coffee plants differ with varying climatic conditions and soil. Changes should therefore be made only after repeated trials are carried out and proved beneficial or otherwise.—*From a report by the Senior Coffee Officer, Department of Agriculture, Colony and Protectorate of Kenya.*

The Mysore Agricultural and Experimental Union, Bangalore.

PROCEEDINGS OF THE ANNUAL MEETING, 1921.

The Fourth Annual Meeting of the Union was held in the Daly Memorial Hall on the 7th and 8th November 1921. Members attended a demonstration of the work of the Austin Tractor and several other implements at the Hebbal Farm on the 9th November, 1921 and inspected the crops, etc., of the Experimental Farm ;

Monday, the 7th November, 1921 :—First Day.

The meeting commenced at 11-30 A.M., with Dr. Leslie C. Coleman, M.A., Ph.D., President of the Union in the Chair. A large number of members and other non-member agriculturists of the State were present. The following among other distinguished Officers of the State very kindly responded to the invitation :—

Mr. C. S. Balasundaram Iyer, B.A., Inspector-General of Education ; Mr. P. G. D'Souza, B.A., B.L., Director of Industries in Mysore ; Mr. R. Ranga Rao, B.A., B.L., Registrar of Co-operative Societies in Mysore ; Mr. V. R. Thyagaraja Iyer, M.A., Census Superintendent in Mysore ; Mr. Zahiruddin Mecci, B.A., Deputy Commissioner, Kolar District, and others.

The meeting commenced with the recitation of the following welcome song composed in Kannada verse for the occasion and sent in by a member of the Union. The member had also sent in a few poems composed in English, which were also read.

ಸ್ವಾಗತ.

ಕಲೆಗಳೊಳು ಕಾರ್ಯದೊಳು ಮುಖ್ಯತಮವಾಗಿಹುದು ।
ಬೆಳೆಯ ಬೆಳವಳಿಗೆಯುಂ ಬೆಳೆಯಿಸಲಿದುಜ್ಜಗವು ।
ಒಲಿದಿದರೊಳಾಸಕ್ತಿಯುಂತೋರೆ ನೆರೆದಿರುವ ಮಿತ್ರರಿಗೆ ಸ್ವಾಗತವಿದೋ ॥
ಹಳೆಯದೆಂದಲೆಗಳೆದು ಭಾವಿಸದೆ ಶೋಧನೆಯ ।
ಕೆಲಸವಿದರಿಂದೇಳ್ಗೆಯಹುದೆಂದು ಸಾದರದಿ ।
ತಿಳಿದೊಲಿದು ಬಂದಿರುವ ಸನ್ಮಾನನೀಯರಿಗೆ ಬಯಸುವೆವು ಸ್ವಾಗತವನೂ ॥ ೧ ॥
ಕೆಲಸಗಳ ಕಠಿಣತೆಯ ಕುಗ್ಗಿಸುವ ಯತ್ನವಿದು ।
ಮಳೆಯ ನಿಷ್ಕಾರುಣ್ಯಮಂ ತಡೆವ ಸಾಹಸವು ।
ಕಳೆಗಳಂ ಬೆಳೆಗೊಡದೆ ಬೇಕಾದ ಬೆಳೆಗಳಂ ಬೆಳೆಯಿಸುವ ಘನಯತ್ನವೂ ॥

ಬೆಳೆಬೆಳೆದು ಬೆಳೆಗೊಡದ ಬೆಳೆಗಳಂ ಚೇತರಿಸಿ।
ಫಲಭರಿತ ಮಪ್ಪಂತೆ ಬೆಳೆಗಳಂ ಬೆಳೆಸುತ್ತೆ ।
ಪಲವು ಸ್ಥಿತಿಕಾಲಕನುಗುಣಮಾಗೆ ಬೆಳೆಗಳಂ ಸಾಕಿಸಲಹುವ ಯತ್ನವು ॥ ೨ ।

ಬೆಳೆಗಳಂ ಬಳಲಿಸುವ ಬಾಡಿಸುವ ಕೈವಿಕೀಟ।
ಗಳ ಹಾವಳಿಯ ರೋಗರುಜಿನಂಗಳಂ ಹರಿಸಿ।
ಸಲಹುವುದು ಬೆಳೆಗಳಂ ಫಲವೀವ ಪೆಂಪಿಂದೆ ಸೊಂಪಾಗಿ ಶೋಭಿಪಂತೆ॥
ಕಲಿತವುಗಳರ್ಹತೆಯ ನೆಚ್ಚರಿಕೆಯಿಂ ನೋಡಿ।
ಬೆಳೆಸುವುದು ಪಲವುಗುಣಮುಳ್ಳ ಕರುಗೋಗಳಂ।
ಬೆಳೆಸಿದೊಡೆ ಸಾಕುವುದು ಯಾತನೆಯೊಳುಪಚರಿಸಿ ಬಾಧೆಗಳು ಬಾರದಂತೆ॥ ೩ ।

ಮನಸಿನಲಿ ಬಹದೆ ಸಾಕೆಂದಿರದೆ ಸಾಹಸಂ।
ಎನಿತಾದೊಡಂ ಲಾಭಮಿಲ್ಲೆಂದು ತೊರೆದುಬಿಡ।
ದನುರಾಗದಿಂ ಬಲ್ಲಿದರ್ ತಾವು ಶೋಧನೆಯ ಕಾರ್ಯವಂ ಕೈಕೊಂಬುದು॥
ಮುನಿಸಿನಲಿ ಮಣ್ಣುಮಣ್ಣಿದರೊಳುಂಟೇನೆಂಬು।
ದನುಚಿತವು ನೇಗಲಿನೊಳುಳುತಿರಲು ಮಣ್ಣುತಾ।
ಜನಕಂಗೆ ಕೊಟ್ಟುದ್ದೆ ಸೀತೆಯನು ಕೊಡುಪುದೆಮ್ಮಯ ಶ್ರಮೆಗೆ ಸರಿಫಲವನೂ॥ ೪ ॥

ಪೂನಾ ವ್ಯವಸಾಯದ ಕಾಲೇಜಿನ ವಿದ್ಯಾರ್ಥಿ
ವಂ॥ ವಾಸುದೇವಮೂರ್ತಿಯವರಿಂದ.

Our Work.

To plough the land and kill the weed
And sow the field with better seed
To help us in our times of need
This is, my friends, this is our creed.

Where there was barrenness before,
If treatment yields us more and more,
And fills to fullness every store,
That is, my friends, that is our score.

If fruits be sweet and flowers fair,
Where we bestow our tender care
And spread around us pleasant air.
There is, my friends, there is our share.

'Work, work afresh and better now'
That is our motto and our vow ;
If obstacles before us bow ;
There is on us the heaven's love.

The President then delivered the opening address printed elsewhere.

After the Presidential address came the Annual Report of the Secretary, which brought out the fact that the experimental work being conducted by members had developed considerably both numerically and

qualitatively. The report further explained the financial condition of the Union, which required to be strengthened very much and appealed to members to carry on strong propaganda among the agriculturists of the State with regard to enlisting a large number of members to the Union and subscribers to the Union's Journal.

The Editor of the Journal then presented a very interesting statement which brought out the facts that the pages of the Journal are not being made use of by a large number of members. He also pointed out that the Correspondence and Query columns are similarly not being made use of although he knew that members had plenty of matter to criticize and enquire about. He emphasized the Secretary's appeal for members and subscribers.

The discussion on the annual report was postponed for consideration at the Business meeting.

Jodidar Mr. B. Venkatathimmappa then moved the following resolution as regards the constitution of a Board of Editors.

"With a view to ensuring greater regularity in issuing the Journal of the Union, both English and Kannada, and making it better representative of the Sciences relating to Agriculture, an Editorial Board responsible to the General Body and subject to being re-constituted (when the interests of the Union require such re-constitution) by that body be constituted generally with the following representation :—

1.	Agricultural Chemistry	1
2.	Do Entomology	1
3.	Do Mycology and Bacteriology	1
4.	Do Botany	1
5.	Do Engineering	1
6.	Do Live Stock	1
7.	Veterinary Science	1
8.	Sericulture	1
9.	Agriculture	1
10.	Farming	2
11.	Horticulture	1
12.	Kannada Language	2
	Total	14

The Secretary of the Union shall be Secretary to the Board. Each

member of the Board shall be the Editor for his section of the Journal. The Board shall elect its own Chairman."

The mover paid a tribute to the present Editor and explained that his proposal was constructive and was intended to strengthen the hands of the Editor and to make the Journal more representative and useful. He appealed to the Heads of the various sections he had proposed to consider that the Union paid them the highest honour it was capable of by inviting them to take up responsibility as Editors.

Mr. N. Rama Rao, B.A., B.L., Superintendent of Sericulture, seconded the resolution and said that the resolution if carried, would give him an opportunity of approaching the Sericulturists of Mysore through the columns of the Journal.

Mr. H. Sreenivasa Rao, retired Deputy Conservator of Forests, supported the resolution.

Mr. A. K. Yegnanarayana Iyer thought that the Board proposed was unwieldy on account of its size and said that even as the Journal Committee is constituted at present it was representative. Mr. N. Rama Rao explained the mover's intentions in proposing the resolution and said that there was nothing unwieldy about the proposed Board as it was unnecessary for all the members to meet together frequently as stated by the mover. The work expected of each Editor was to invite contributions on his subject, suggest "Selections" from other Journals, etc., contribute material for the Editorial columns and forward all this matter for publication.

Mr. Venkata Rao K. Badami also refuted the argument of unwieldiness.

The resolution after having been strongly discussed by various members was put to the vote and carried almost unanimously only seven members voting against it. The election of members was postponed to the Business meeting.

The next resolution was by Mr. D. B. Sivarama Rao, L.Ag., and read as follows :—

"This meeting resolves that the Kannada edition of the Journal be published once in two months instead of once in three months as at present, the matter contained in four English Journals being spread over six Kannada numbers." The mover stated that the Kannada Journal was being issued very irregularly and that there was a strong feeling amongst

the members and subscribers who take this edition of the Journal, in this matter. His resolution, if carried, would reduce the work of translation for each edition of the Kannada Journal and by enabling the Editorial Board to issue the Journal with regularity would keep the Kannada members in touch with the work of the Union.

Mr. G. Girimaji Rao of Kolar seconded the resolution.

Dr. B. Narasimha Iyengar suggested that the original matter and selections might be published in parts and supported the resolution.

Mr. N. Rama Rao suggested that the Kannada Journal might be independent of the English Journal. He thought that the translation, however good, would not be as good as an independent Kannada composition and that as there were a large number of non-English-knowing people who could write on agricultural matters, these people should find an opportunity to express their views.

The President explained that the Journal was the organ of the Union and as such it was mainly the exponent of the Union's work. Expressed in whatever language, the ideas would be the same. He further pointed out that if the suggestions were accepted, fifty per cent of the contributors who cannot write in the Vernacular would be precluded from contributing and that as there was shortage of contributors for the English Journal even as it is, the publication of a Kannada Journal in the way suggested would be hopeless.

Many of the Kannada members supported the resolution, some of them suggesting yet greater frequency of issue.

The resolution, put to the vote, was carried almost unanimously. Mr. D. B. Sivarama Rao, then moved his second resolution "that the membership fee and subscription for the Journal be raised from Rs. 2 and Rs. 3 respectively to Rs. 4 in each case." The mover in support of his resolution reiterated that the financial condition of the Union required strengthening.

Mr. N. Krishna Iyengar of Uragahally seconded. Mr. S. D. Achar opposed on the ground that agricultural literature should be made available as cheap as possible and that increase in subscription would reduce the number of subscribers.

The President explained that there was a limit beyond which reduction in the amount of subscription would be impossible.

Many of the Kannada members opposed. Mr. V. S. V. Sharma moved an amendment that the annual fee of members be raised from

Rs. 2 to Rs. 3. Mr. Srinivasa Iyengar of Masti seconded and Mr. L. S. K. Paliengar supported. The amendment, put to the vote, was carried almost unanimously only 7 voting against. The resolution thus amended was declared carried. The meeting then proceeded to consider the report on experimental work of members.

Mr. H. Srinivasa Rao's report on the trial of the Hebbal plough made at the M. S. M. Railway-workshop was read. The report was conclusive that the Hebbal Plough was superior to the Kolar Mission plough as regards depth and width of ploughed furrow and inversion of ploughed soil. The Hebbal plough was slightly weightier and perhaps increased draught but Mr. Srinivasa Rao had not tried this with a dynamometer.

Mr. Srinivasa Rao's reports on the trial of varieties of ragi and groundnut were considered by him as being unfair as conclusive experimental data as the crops suffered from severe drought which prevailed in 1920.

Dr. N. S. Iyengar of French Rocks who had undertaken to carry out sugarcane trials complained that most of the eye buds of seed canes had been stripped out due to bad handling in transit and therefore the germination was very poor. The stand was very poor but whatever remained had come up well. His plough trial was incomplete as the share got broken while working on wet land.

The President explained that all care was being taken to ensure safety of eye buds and invited suggestions as to how best the trouble could be overcome.

The practicability of transport of seed canes by cart was considered unsuitable for distances.

But other members who had also taken out seed canes for trial did not have the same experience as Dr. Iyengar. They had received canes all right.

Mr. Siva Rao Badami, another experimenter, complained of having received canes so late as May. They did not germinate properly.

Mr. N. Krishna Iyengar suggested that seed canes to be sent out for trial might be packed in casks, ragi chaff being stuffed in tightly to protect the buds.

Mr. Venkata Rao Badami said that after canes began to be packed in gunny bags there were fewer complaints.

Mr D. G. Ramachandra Rao suggested that seed canes should be sent unstripped.

Mr. B. Narasinga Rao reported that his experimental groundnut crop came up very well but there was considerable damage by pigs, etc.

Mr. A. S. Krishnaswamy of Arkalgud reported having received seed canes in a damaged condition. He received other seeds late but was trying a small quantity of groundnut varieties which had come up very well.

Mr. R. Hera Singh complained of having received seeds late. His groundnut crop had come up fairly well.

Mr. D. B. Sivaram Rao reported for Mr. M. G. Shama Rao of Bowringpet that the latter's groundnut varieties had come up well.

Mr. N. Krishna Iyengar's report on seedling canes was read. As the result of his experiment Mr. Krishnaiengar found that in point of vigour of growth, tillering, and low flowering, No. 544 seemed the best and 314 the worst except as regards low flowering. He had made good light coloured jaggery out of all the varieties. He is trying all these varieties excepting H. 314 this year also.

The meeting then proceeded to consider the results of experiments on the manuring of sugarcane with ammonium sulphate. Mr. N. Krishna Iyengar stated that he had applied no cattle manure to any of the experimental plots. The check plot received one ton of oil-cake. He could not notice much difference in growth from plot to plot but the crop was coming up well.

Messrs. H. Ramachandra Shastry of Aradeshahally, H. Srinivasa Rao of Hongenahally, Venkata Rao K. Badami, Siddlingappa of Kuramkote, Siva Rao B. Badami, all reported that ammonium sulphate plots in their experiment were distinctly better than other plots. As the result of this remarkable difference in growth, Mr. H. Srinivasa Rao said, there was already much demand for ammonium sulphate in his place from ryots. Mr. Badami had manured citrous plants with ammonium sulphate and the growth was remarkable.

Many of the experimenters being absent, the discussion on experiments were reserved to be taken up again the next day.

The meeting at this stage adjourned for lunch.

After lunch, Mr. H. Srinivasa Rao's report on Cocoanut Beetle investigations was taken up for consideration. The following points were brought out in the report.

(1) The most virulent attacks by the beetle are found to be about the middle of April, the virulence continuing up to about the 10th July.

(2) Tying up spreading leaves of small plants is advantageous in as much as attack in plants so treated fell by about 30 per cent.

(3) No plants were attacked amidst growing crops of sugarcane, cholum and betel leaves.

(4) Hooking out the beetles from the holes does damage to the plants and Mr. Srinivasa Rao is trying whether filling in the holes with a saturated solution of common salt will bring out the beetles. He will also try the effect of marothi (*Hydnocarpus whittiani*) oil-cake as a repellant.

Mr. L. S. K. Palaiengar wanted to know why cocoanuts, when yet very young, rot and drop off He was asked to send samples for investigation.

Mr. H. Srinivasa Rao then read a paper on Well-Irrigation in Mysore, printed elsewhere in the journal.

The President wanted to know which agency should undertake the work of well-boring. He did not think that a Co-operative Society would prove equal to the task but a Joint Stock Company might.

Mr. H. Srinivasa Rao thereupon moved a formal resoultion as follows:

"That with a view to rendering assistance to ryots in well sinking, a small technical agency with suitable mechanical equipment be attached to the Agricultural Department, the details of staff and equipment being left for decision to the Director of Agriculture."

Mr. M. S. Lingegowda seconded.

Mr. A. K. Yegnanarayana Aiyar in supporting the resolution explained the various difficulties the ryots are suffering from on account of want of proper help during the sinking of a well.

Mr. N. Rama Rao pointed out that Mr. Srinivasa Rao's paper had raised but did not solve the formidable difficulty of labour. In his opinion some agency, such as the P. W. D., which is in touch with labour should be entrusted with the work. He did not think that the Co-operative Department could do much, but a Joint Stock Company might be started. Mr. Rama Rao formally moved another resolution to the effect "that Government be moved to take steps in consultation with the P. W. D., or otherwise, to organize a labour agency for carrying out subsidiar yirrigation work, such as wells, at the instance of agriculturists."

Mr. L. S. K. Pala Iyengar seconded the resolution.

The President was not sure if there would not be clash if two agencies were at the same work.

Mr. H. Srinivasa Rao's resolution was put to the vote and carried, none opposing.

Mr. Rama Rao's resolution was then put to the vote and carried, 19 voting for and 5 against; the majority of members present remained neutral.

Mr. C. B. Krishna Moorthy, Agricultural Inspector, Maddagiri, read a paper on the Cultivation of Dodda Rasatali Sugarcane. A net profit of Rs. 265 was shown for an area of a quarter of an acre.

The President doubted if the same rate of profit would result from a larger area, say 10 acres.

Mr. Narsinga Rao, Editor, Law Gazette, Bangalore, in a paper on "Agriculture and its Neglect" made a vigorous appeal to the educated young men to take up agriculture as a profession.

The meeting adjourned for the next day.

Tuesday, the 8th November, 1921.— Second Day.

In the morning, members went round the laboratories of the Department of Agriculture and the Pot Culture House. They inspected the specimens of Hebbal Seedling canes which Mr. A. T. Mac Issac of Gangenahally Estate, had very kindly sent for exhibition to members.

The meeting commenced at 12 noon. Rajasabhabhushana Rev. A. M. Tabard, M.A., M.R.A.S., etc., President of the Mythic Society, very kindly attended the meeting.

The Secretary read the proceedings of the previous day's meeting which were adopted.

The President thanked the Rev. A. M. Tabard for kindly allowing the Union the use of the Hall.

Mr. T. Narsinga Rao then opened a discussion on the "General Improvement of Gomal Lands" with a short speech, in which he suggested the following improvements:—

(1) To remove shrubs of lantana and thorns in their Gomal lands by the villagers.

(2) By enclosing the grazing lands by live fences and dividing them into different blocks so that cattle may be let in into these blocks.

(3) Another simple improvement would be not to pick up the droppings of the dung dropped by cattle while grazing, to be made into bratties.

(4) After these simple improvements are adopted by some villagers at least, then we may consider ploughing and manuring of Gomal lands.

Mr. N. Rama Rao who spoke next, strongly recommended the abolition of Gomal. His speech is published *in extenso* elsewhere.

Mr. N. Krishna Iyengar of Uragahally pointed out that in Nagamangala, Mandya and such famous cattle breeding tracts, cattle are not grazed on gomal lands but are raised at home on home feeding. Cattle reared on Gomal and such neglected land give a calf once in four or five years; in Nagamangala they calve once a year. Further, gomal lands are the breeding places of disease. Mr. Krishna Iyengar agreed with Mr. Rama Rao that the best way of improving the gomal is to abolish it.

Mr. W. Davison, who spoke next agreed with Mr. Rama Rao. The best way of effecting the improvements suggested by Mr. Narsinga Rao, was, in his opinion, the removal of community ownership. Too many cattle of low market value and of little practical use are now being maintained by the ryot, as he says, for obtaining manure. The quantity of manure got is certainly not commensurate with the effort spent on raising the cattle, and further, the manure obtained from such animals is poor in quality. The ryot does not care what he makes out of this huge number of cattle and keeps them in a state of neglect. He wants more land for grazing so as to get more manure by keeping more cattle. He cares little to improve the condition of gomal where his cattle are supposed to graze.

Quite a number of members speaking in Canarese contended that if the gomal were abolished the poor and the landless who wish to raise cattle, who would like to keep a cow for milk for the family, would have no land to graze their cattle on. Some members recommended that gomal lands belonging to a village should be allotted for cultivation to the villagers. Others would retain the gomal as it is, yet others would give out part of the gomal to the poor and the landless and allot the rest. But Mr. D. G. Ramachandra Rao recommended the retention of the village common land on the ground that cattle required place for wandering about in order to keep up health. In his opinion, allotment would be possible wherever there was a large area but not where the area was limited. Even where a large area is available, he would recommend the reservation of some land as village common land.

The President explained that in Europe where the holdings are small and there is no place for the cattle to wander about, cattle are raised quite healthy. Common lands have ceased to exist in Europe.

He wished to know why a part of the land should not be reserved for the landless and the rest handed over to private ownership. As regards the clearing of lantana by compulsion, he gave the example of Coorg and other places where compulsion was tried by Government and found hopeless. Nobody would clear the land of lantana unless the land was owned by him.

Mr. M. S. Lingegowda wanted the members to remember that good animals are got where they are not raised on the gomal. Good animals are raised only by hand feeding.

Mr. R. Gopalaswamy Iyer drew the attention of members to the fact that in Tanjore there is no gomal land. In places like Tinnevelly where an acre of land costs two and half to three thousand rupees, one could not think of reserving land for grazing. Nevertheless they raised good cattle in those parts. The argument that gomal land is necessary for raising cattle was plausible and fallacious. He would recommend the abolition of gomal land.

Mr. G. T. Venkatachar pointed out that the man who wanted to raise good cattle did not send them to the gomal but it was the poor man who sent his cattle, goats, etc.

Mr. Narsinga Rao, replying, was in agreement with Mr. Rama Rao and others who favoured the abolition of gomal land but he thought the ryots would strongly resent such a step.

Mr. M. S. Lingegowda then formally moved: "This meeting is of the opinion that the present neglected state of gomal lands throughout the State is entirely due to the communal nature of these lands, and the lack of individual interest in their improvement. They are further strongly of opinion that the existence of common grazing grounds is antagonistic to the proper breeding of cattle and the control of contagious diseases.

They therefore resolve that the present gomal system be done away with, and the land be divided and given over to individual ownership, preference being given to the cattle owners of the village to which it was originally attached."

Mr. N. Krishna Iyengar seconded. Mr. D. G. Ramachandra Rao moved an amendment to the effect that "Preference should be given to cattle owners who do not now possess any land." Mr. Srinivasa Iyengar of Masti seconded the amendment which was put to the vote and lost, 17 members voting for the amendment and 32 against it.

Mr. A. K. Yegnanarayana Iyer who joined the meeting at this stage moved another resolution as follows :

This meeting resolves :—

"That gomal lands may be apportioned subject to the following among other conditions :—

1. That the land should be used only for the purpose of raising fodder.

2. That the land should not become the absolute property of the holder, and should be unalienable.

3. That the extent to be granted to each ryot bear a definite ratio to his arable land in the village."

Mr. Venkatasubba Shetty seconded.

Mr. W. Davison was of the opinion that no condition should be attached in regard to the use to which the land should be put, as all were agreed that something should grow where nothing but thorn and lantana grew at present. He contended that there were some who kept cattle as a hobby, others for domestic use and yet others raised cattle as an industry. If land were to be apportioned out to a ryot in proportion to his arable land, the man who may not care to raise cattle gets land and is compelled to keep cattle against his inclination, whereas the man who is inclined to do so is precluded from securing a larger area.

Mr. Venkatasubba Shetty did not think that any one kept cattle as a hobby.

Mr. N. Krishna Iyengar raised the point that it should be found out first of all which land is suitable for growing grass. Under the restrictions proposed the ryot cannot carry out a proper rotation and would be compelled to grow fodder only.

Mr. Yegnanarayana Iyer thought that the chances of land being allotted to one who does not keep cattle were few. If land was allotted without condition, the Bangalore ryot would grow casuarina.

Mr. Lingegowda's resolution was put to the vote and carried, only one voting against.

Mr. Yegnanarayana Iyer's resolution was then put to the vote and also carried, 36 voting for and 19 against.

The meeting adjourned for lunch.

Re-assembling after lunch, the meeting proceeded to discuss the subject of Farm Accounts, which had been referred to a Sub-Committee at the last Annual Meeting for report. Mr. A. K. Yegnanarayana Iyer, the Convenor of that Sub-Committee, in presenting four forms of account which every farmer ought to maintain, explained how the question started at the 1919 Annual Meeting, and proceeded to explain the forms. The object of any system of farm accounts which a farmer might follow, he maintained, should be to show him at the end of a year whether the year had brought him profit or not. It is not enough if the account simply shows total profit. It should make clear which item of his business or which crop paid a profit and which did not. There must be an account to show which method of farming has been profitable, such as the use of improved ploughs, new crops, improved practices and so on. There must be an account to show the returns from his Dairy herd, etc.

He then recommended

1. A Cash Register,

2. A Stock Book, to show what the farmer had at the beginning of the year and what he had at the end of it,

3. A Crop Ledger to show the income from each item of business or crop, and

4. A Labour Attendance Register.

Mr. D. G. Ramachandra Rao, who spoke next, thought that the Cash Register suggested might be simplified, an abstract of all items being entered instead of in detail. He thought that the register proposed would have blank columns on many days as there would be no entries to make. He suggested the addition of a Day Book (to the set of four forms) from which postings might be made at leisure. The Stock Book was all right, but, in his opinion, a Daily Labour Sheet was quite necessary to show how much labour was spent on each item, which could not be found out from the forms proposed.

The President also wanted to know if from the forms recommended one can find out how much labour was spent on each item. The mover replied that very accurate returns would not be available but the cash book would supply the entries.

Mr. Venkata Rao K. Badami suggested the addition of a column in the Labour Attendance Register to include "Bullock Labour" and to distinguish how the labour was employed he suggested that some marks or signs might be employed. The mover accepted the suggestions.

Mr. N. Krishna Iyengar doubted that really accurate information would be available. The mover replied that the account would not be extremely accurate but would certainly, though roughly, reveal the situation at the end of the year.

Questioned by the President whether the personal labour of the farmer would find a place in the set of accounts proposed, the mover replied that the idea was to find out whether, exclusive of personal service and that of the cattle maintained, the farmer had made anything at all.

The objection that when there are five items of work done by a labourer in a day, proper allotment to items could not be made, was found to be not a really serious one. Mr.T.Narsinga Rao proposed a Daily Labour Account such as that maintained on Coffee Estates and in which daily allotments were entered, in addition to the Labour Attendance Register. The mover and the meeting accepted the suggestion.

It was decided that the forms, as modified, might be printed in the Journal of the Union, with entries to illustrate.

Mr. N. Krishna Iyengar wished to know if there were members who would maintain accounts on the lines decided and furnish returns. There were members ready to do so.

As there was a heavy programme to be gone through and time was short, the discussion on "Compulsory Castration of Cattle" was dropped.

Mr. S. D. Achar read a paper on "The Civil Veterinary Department and its purpose."

The President had no hesitation in accepting as right the programme which Mr. Achar had chalked out but the pursuance of it, he pointed out, was a matter of funds and as funds became available more and more work would certainly be done.

Mr. N. Rama Rao enquired if serum could not be manufactured here instead of being got from Mukhtesar. Major Simpson replied that it was possible but he thought it unnecessary to do so.

Messrs. H. Srinivasa Rao, N. Krishna Iyengar, and H. Ramachandra Shastry explained the advantages of compulsory castration.

The President invited opinion if prompt report of outbreak of contagious diseases would not lessen the number of animals which had to be inoculated. Major Simpson replied in the affirmative and it was generally agreed that the method of reporting required considerable improvement.

Business Meeting.

The President requested the Vice-President Mr. Yegnanarayana Aiyar to preside and on the latter taking the Chair, Dr. Coleman explained why he wished a non-official gentleman to be the President of the Union and proposed Mr. N. Krishna Iyengar to be the President of the Union for the next year. Mr. Krishna Iyengar did not agree and proposed Dr. Coleman instead. The meeting unanimously appealed to Dr. Coleman to accept the Presidentship and the Chairman very happily added that the members wanted Dr. Coleman to be the President not because he was the Director of Agriculture, but because he was Dr. Coleman. It was impossible to resist so unanimous an appeal and Dr. Coleman very reluctantly accepted the Presidentship for one year only and took the Chair again amidst applause.

Mr. N. Krishna Iyengar was unanimously elected to be the Vice-President. The following Managing Committee was elected :—

1. Mr. A. K. Yegnanarayana Iyer, M.A., N.D.D., etc.
2. ,, N. Rama Rao, B.A., B.L.
3. Dr. B. Narasimha Iyengar, B.A., Ph.D.
4. Mr. H. Srinivasa Rao, retired Deputy Conservator of Forests.
5. ,, W. Davison, B.S.A., Live Stock Expert in Mysore.
6. Major R. W. Simpson, Superintendent, Civil Veterinary Department.
7. Mr. A. T. Mac Issac, Gangenahally Estate.
8. ,, M. S. Lingegowda, Vasantapur Estate.
9. ,, T. Narsinga Rao, Coffee Planter, Chikmagalur.
10. ,, R. Gopalaswamy Iyer, Bangalore.
11. ,, Siva Rao B. Badami, Jahgirdar, Debur.
12. Dr. K. Kunhi Kannan, M.A., Ph.D.

Standing Committee.

1. President.
2. Vice-President.
3. Dr. B. Narasimha Iyengar.
4. Mr. M. S. Lingegowda, and
5. The Secretary.

Board of Editors.

1. Dr. B. Narasimha Iyengar, B.A., Ph.D.— *Chairman*
2. ,, K. Kunhi Kannan, M.A., Ph.D.
3. Major R. W. Simpson, M.C., G.B.V.C.

4. Mr. M. J. Narasimhan, B.A.
5. ,, Venkata Rao K. Badami, L.Ag.
6. ,, W. Davison, B.S.A.
7. ,, M. G. Singrachar, B.A., A.C.E.
8. ,, N. Krishna Iyengar, B.A.
9. ,, D. G. Ramachandra Rao.
10. ,, H. Srinivasa Rao.
11. ,, T. Narsinga Rao.
12. ,, B. Venkatanarnappa, M.A.
13. ,, K. Bhima Rao, B.A., F.C.S.
14. ,, N. Rama Rao, B.A., B.L.

Secretary of the Union to be the Secretary to the Board.

The meeting then proceeded to discuss the programme for the coming year.

Mr. Venkata Rao Badami explained to members the question of starting Harvesting experiments.

The following members undertook to conduct the experiments :—

1. Mr. M. S. Linge Gowda, Bull Temple Road, Basavangudi.
2. ,, B. Narasinga Rao, Editor, Law Gazette, Bangalore City.
3. Dr. N. S. Iyengar, French Rocks.
4. Mr. R. Gopalasamy Iyer, IV Road, Chamarajapet, Bangalore.
5. ,, M. N. Shamiah, Hon. Superviser, Co-operative Societies, Srinivasapur.
6. ,, Chikke Gowda, Patel, Sravandahalli, Maddagiri Taluk.
7. ,, Eare Gowda, Landlord and Member, Kolar Taluk Board, Sugatur.
8. ,, A. S. Venkatakrishnappa, Shanbhogue, Arekere, Tumkur District.
9. ,, Siddalingappa, Landholder, Kuramkote, Koratagere.
10. ,, M. Srinivasa Iyengar, Landholder, Masti, Malur Taluk.

It was decided that a circular explaining the nature of experiments, etc., be drawn up by the mover and sent to the members.

As regards the other experiments it was decided that the Secretary should send a circular enumerating the experiments proposed to be conducted during the year to members and arrange about the experiments.

The President in his concluding speech characterised the discussions as highly instructive and profitable to all present.

It was decided that a General Meeting should be held in May to discuss the results of the year's experiments.

Votes of thanks to the Chair, the out-going members of the Committee and the authorities of the Daly Hall were moved and carried with acclamation.

Three cheers to His Highness the Maharaja were lustily given and the meeting adjourned to meet again the next day on the Hebbal Farm.

[N. V. S.]

Wednesday, the 9th November, 1921.— Field Day.

The last day of the Annual Meeting of the Union was spent at the Hebbal Farm. The members met there in the morning. Demonstration of the new Hebbal plough, the new disc harrow and the trenching machine was arranged for the benefit of the members.

The new Hebbal plough was worked and the work was compared with that done by the Kolar Mission plough. Both were worked on the same field ; and the soil was more or less uniform throughout. A dynamometer was used for testing the draught of the ploughs. The draught per square inch of soil turned over was measured in both cases and it was found that the new plough had a slightly lighter draught. While it averaged about 7 lbs.to the square inch in the case of the Kolar Mission plough, it was only about 5½ lbs. in the case of the new Hebbal plough. Further it was noticed that the turning over of the furrow slice was much more complete in the case of the new plough. These combined with the fact that the expense for renewals is very small make the new plough a very desirable kind of implement, and if it could be placed in the hands of the cultivator at a reasonable price, there would be a great demand for it.

The trenching machine was worked by the Austin Tractor. It opens out a trench about 5″ wide and is said to work up to a depth of five feet. The earth removed by the share is taken up by a travelling, endless band, and is thrown out to a side, so that the machine can be worked up and down in the same trench till the desired depth is obtained. The usefulness of this machine seems to be limited in these parts.

The new disc harrow has two gangs of discs and these can be shifted about so that both sides of a row of crop can be cultivated at the same time, and also orchards can be cultivated right up to the trees.

The members were taken round the farm in batches and shown the various experiments both in the dry area and in the wet area. A move

was then made to a plot of land where a ryot was growing the farm seedling cane H. M. 544 and local striped, side by side, giving the same amount of manure and the same treatment to each. The difference in the growth of the two was striking, so much so that the demand locally for H. M. 544 cane has been quite brisk.

Dinner was arranged for the whole party in the school hostel. The departmental lorry was very helpful in bringing the members to the farm and taking them back to Bangalore. The party dispersed after tea in the evening. [G. S. K.]

BUTTER **BUTTER**

FRESH & CLEAN

made in the Mysore Government
Agricultural School Dairy.

Packed in 1 lb. and ½ lb. tins.

Price Re. 1-10-0 per lb., packing and postage extra.
Arrangements can be made for sending
daily consignments.

Apply to :

The Dairy Inspector,
Hebbal Experimental Farm, P. O.

FARM ACCOUNTS.

A.

CASH REGISTER.

RECEIPTS.

Date	Purpose for which received	From whom	Live Stock sold	Farm produce sold	Miscellaneous	Total	Remarks
1	2	3	4	5	6	7	8

EXPENDITURE.

Date	Nature of payment	To whom made	Live Stock bought	Seed	Manure	Cattle feed	Labour	Implement & machinery	Buildings	Miscella-neous	Remarks
1	2	3	4	5	6	7	8	9	10	11	12

B.

LABOUR ATTENDANCE REGISTER.

Month.....192

Name of Labourers	1	2	3	4	.....	30	31	Total attendance	Rate Rs. A. P.	Total Rs. A. P.	Remarks
Permanent											
Temporary											

C.

DAY REGISTER — For Labour

Date	Days of the week	Ragi				Sugar-cane				Paddy			
		Men	Women	Boys	Bullocks	Men	Women	Boys	Bullocks	Men	Women	Boys	Bullocks

				Miscellaneous				Total				Cost
Men	Women	Boys	Bullocks	Men	Women	Boys	Bullocks	Men	Women	Boys	Bullocks	

D.

STOCK BOOK.

Date	Particulars	Receipts						Expenditure						Balance					
		Live Stock No.	Produce					Live Stock No.	Produce					Live Stock No.	Produce				
			No.	Quantity					No.	Quantity					No.	Quantity			
				Mds.	Srs.	Pallas	Srs.			Mds.	Srs.	Pallas	Srs.			Mds.	Srs.	Pallas	Srs.

E

11 Name of crop. CROP LEDGER. Area on which grown.

Receipts				Expenditure			
Date	Particulars	Quantity	Value Rs. A. P.	Date	Particulars	Quantity	Value Rs. A. P.

A man and a pair of bullocks may be charged at Rs. 1—8—0 per day or other sum usual in the tract.

251

F

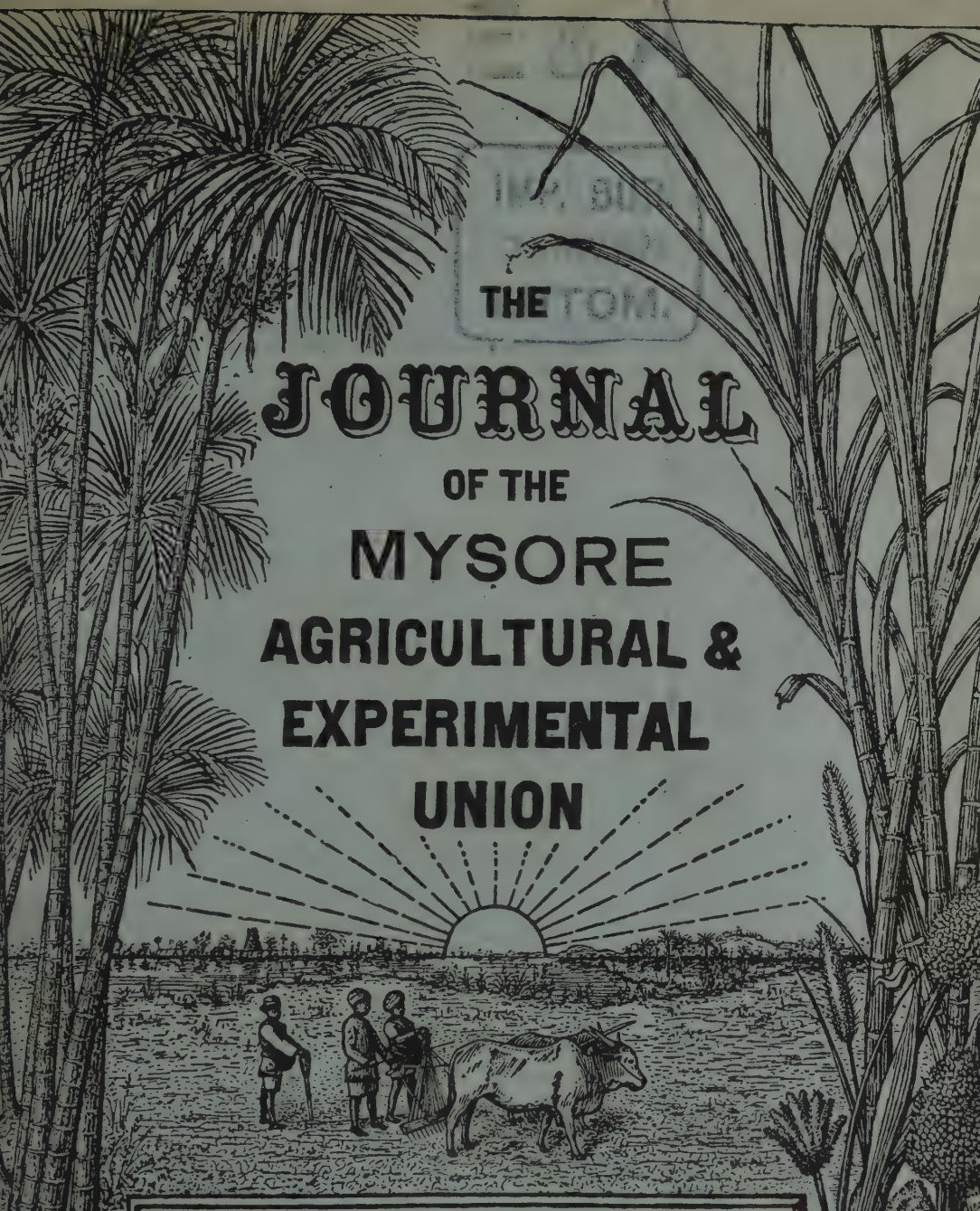
BALANCE SHEET.

Receipts.	Rs.	A.	P.	Expenditure.	Rs.	A.	P.
Col. 4 Live stock sold				Col. 4 Live Stock bought			
Col. 5 Produce sold				Col. 5 Seed Stock bought			
Col. 6 Miscellaneous receipts				Col. 6 Manure do			
				Col. 7 Cattle feed bought			
				Col. 8 Labour			
				Col. 9 Implements and machinery ..			
				Col. 10 Buildings			
				Col. 11 Miscellaneous			
Total ..				Total ..			
Add value of stock on Farm at the end of the year				Add value of stock at the beginning of the year			
Balance				Balance			
Grand Total				Grand Total			

It is easily seen that the difference between the total of Receipts and Expenditures represent the balance, showing total "profit" or "loss," as the case may be.

IMP. BUR... TOM...

THE JOURNAL OF THE MYSORE AGRICULTURAL & EXPERIMENTAL UNION



Vol. III.] MARCH 1921 [No. 1.

PRINCIPAL CONTENTS.

The Uragahalli Estate and Farm—
BY THE EDITOR.

The Insect Pests of Mysore—
BY T. V. SUBRAMANIA IYER.

Silage on the Hebbal Farm Dairy—
BY W. DAVISON, B.S.A.

CONTENTS.

Some noteworthy Farms and Farmers of Mysore—

The Uragahalli Estate and Farm of Mr. N. Krishnayyangar, Inamdar of Uragahalli—By the Editor. 1— 6

Dry Cultivation near the town of Mysore—By Mr. K. Narasimhaiengar, Mysore Normal Training School. 7— 9

The Cultivation of Rasabalē Plantain near Nanjangud—By Mr. M. S. Ramachandra Rao, Agricultural Inspector ... ... 19—2

Notes on the more Important Pests of Crops in the Mysore State—By Mr. T. V. Subramania Iyer ... 12—19

The Areca Drier—By Mr. Kuntgodu Sivaramayya ... 20

NOTES AND COMMENTS:—By the Editor.
Silage at the Hebbal Dairy—The Vth Quinquennial Cattle Census in Mysore—Fighting the Sugar-cane Borer with parasites from Cuba—The Mango Hopper and Mildew—New Crops in California—The Care of Mango Orchards—Cocoanut Varieties—Sugar-cane Cultivation in the Districts—Peanut Butter in the United States of America. ... 21—27

SELECTIONS:—
The Poisonous properties of Castor-oil Beans—The Record of 'Calamity Snow Pontiac', *the World's Champion Heifer*—Relation between the Hour at which the Mulberry Leaves are picked and the Silk Yield of the Silk-worm—Modern Methods of Crop Production, *Pulling together*—The Jackal Plague in South Africa—Udders and what they tell—The Preparation of Papain—The Newer Knowledge of Plant Nutrtiion—Tests of Ploughs in India—Employment of Agricultural Macinery in the Cultivation of Rice in California—Some Causes of Co-operative Failures—Changes in Manure during Storage—Artificial Silk Industry in France—Building up a Dairy Herd—The Edible Date—Planting Sugar-cane between Two Rice Crops—The Bassia or Mowra Tree—The Results of the Vth Quinquennial Cattle Census in the Mysore State. ... 28—54

Our Query Colomn—

Silage in the Hebbal Farm—By Mr. W. Davison, B. S. A. ... ... 55—56

Notification by the President—

Varietal Trials of Ragi, Groundnut and Castor ... 57—59

Advertisements 60

E. & A.

THE JOURNAL OF THE MYSORE AGRICULTURAL & EXPERIMENTAL UNION

IMP. BUR.
23 NOV. 192
ENTOM.

Vol. III.] JUNE 1921 [No. 2.

PRINCIPAL CONTENTS.

The Availability of some Nitrogenous Manures—
BY B. NARASIMHA IYENGAR, Ph.D.

The Coffee Industry in Java—
BY J. HUIDEKOPER

The Insect Pests of Mysore—
BY T. V. SUBRAMANIA IYER

CONTENTS.

On the Availability of some Nitrogenous Manures — a preliminary report — By B. Narasimha Iyengar, Ph.D., Agricultural Chemist in Mysore .. .. .. 61—68

Ways adopted in Java for the development of the Coffee Industry — By J. Huidekoper of the National University, Adyar .. .. 69—75

The Cultivation of Chillies at Kottamangala, Mulbagal Taluk, Kolar District — By N. Venkatasubbayya, M. A. & E. Union .. .. 76—77

The Necessity for a Model Farm in every Taluk — By C. Bhima Rao, Land-owner and Hon. Supervisor, Co-operative Societies, Channagiri, Shimoga District .. 77—80

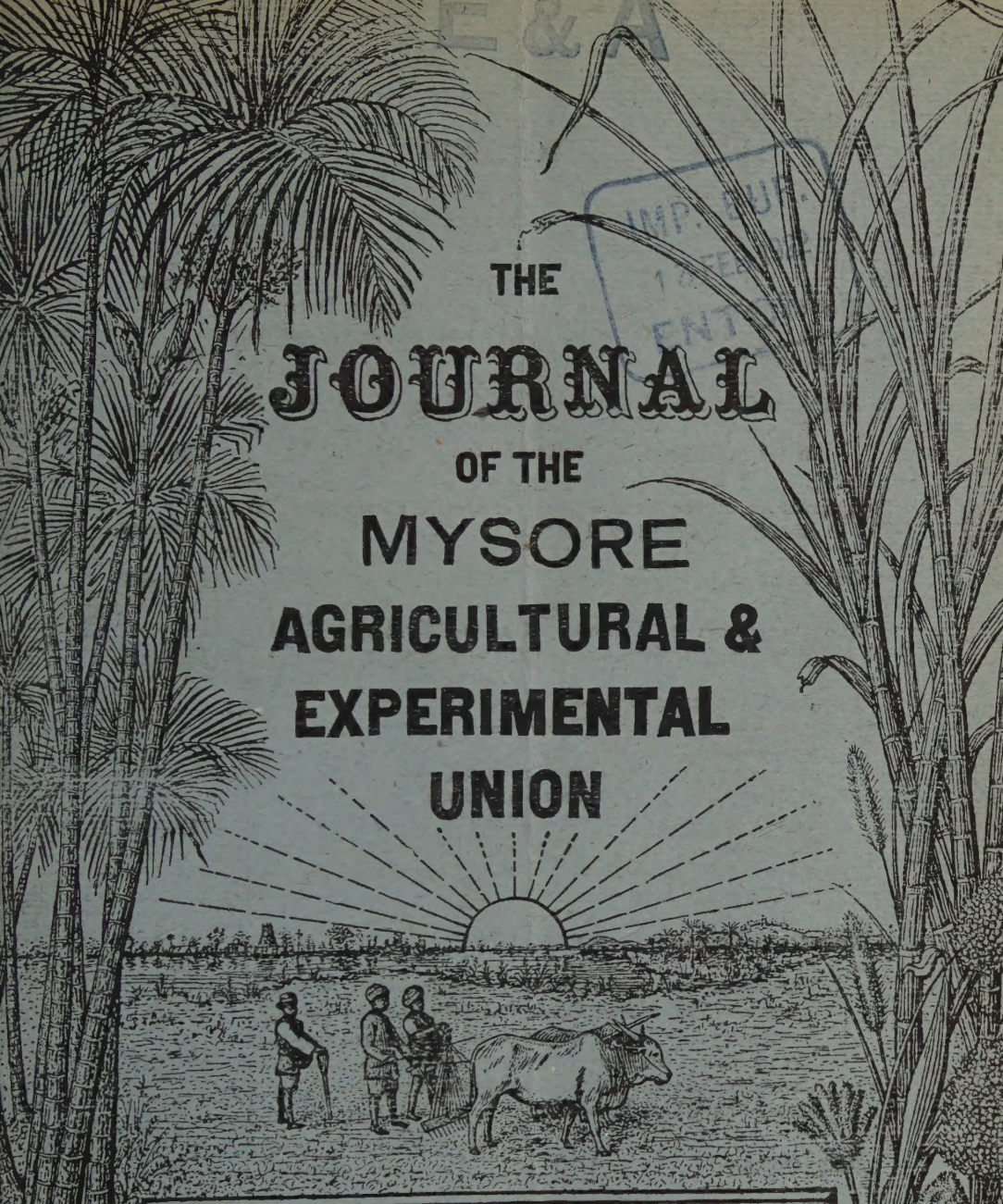
Notes on the more Important Insect Pests of Crops in the Mysore State — By T. V. Subramania Iyer, Assistant Entomologist .. .. 81—85

NOTES AND COMMENTS — By the Editor.
Revision of Scale of Pay in the Indian Agricultural Service — Filled Milk — Books on Agriculture to Members of the Union — Germination Tests — Book-keeping for Farmers — Sulphate of Iron for Chlorosis — "Sucre Complet," Complete Sugar from Beets — Sulphate of Ammonia manuring for Sugar-cane .. 86—89

SELECTIONS :—
Fine Soil more Fertile — Nitrogen Losses in Urine — The Origin of the South-west Monsoon — The Coir Industry on the Malabar Coast—Bud Variations in Sugarcane and their Use — The Selection of *Heavea brasiliensis* according to Individual Differences — The Arrowing of the Sugarcane — Cattle Insurance — Results of Crossing the Zebu with European and Australian Cattle in British and Dutch India — Weed Control and Fertilization — Economic Conditions of Power Farming— Note on Cultivation of Yams in and round Sivakasi, Ramnad District — Indian Agricultural Service. .. 90—109

Notification by the President

The Lending Library .. .. 110—114



THE JOURNAL OF THE MYSORE AGRICULTURAL & EXPERIMENTAL UNION

Vol. III.] SEPTEMBER 1921 [No. 3.

PRINCIPAL CONTENTS.

The Government Farm at Babboor—
BY K. M. GURURAJA RAO, L.Ag.

The Insect Pests of Mysore—
BY T. V. SUBRAMANIA IYER

Agriculture in the French War-Zone—
BY W. DAVISON, B.S.A.

CONTENTS.

	Page
The Government Farm at Babboor, Chitaldrug District.—K. M. Gururaja Rao, L.Ag., Farm Manager, Babboor Farm	115—120
Notes on the more Important Insect Pests of Crops in the Mysore State.—T. V. Subramania Iyer, Assistant Entomologist, Mysore Agricultural Department	120—127
Agriculture in the French War-Zone.—W. Davison, B.S.A., Live Stock Expert in Mysore..	127—130
Our Members and Their Work — Results of Plough Trials ..	130—133
The Cultivation of Irrigated Ragi in Maddagiri Taluk.—C. B. Krishna Murthi, Agricultural Inspector, Maddagiri.	134—136
From our Co-operators.—	
H-22 Ragi in Sabbanahally, Goribidanur — H-22 Ragi in Bindiganahally, Hoskote Taluk — H-22 Ragi in Siddlaghatta, Kolar District — Ammonium Sulphate on Sugar-cane — Ammonium Sulphate as Manure for Sugar-cane in Ganerlahally, Bowringpet Taluk — The Effect of Ammonium Sulphate on Sugar-cane—Spraying for plant Lice.	137—141
Notes and Comments.—By the Editor.	
The Menace of Synthetic Indigo again — The Cletrac Tractor — The Indian Sugar Industry and the Central Government — The Promotion of Cotton-growing in the British Empire—Delinting Cotton Seed — The Cocoanut Beetle again — Boring and Pumping Machinery—The Water Hyacinth.	142—147
Selections.—	
Shelter or wind break for Bananas — The Systems under which Sugar Factories in Cuba purchase Sugar-cane from growers — Distance in planting Cotton — The Rhinoceros or Black Beetle — The Poling of the Agaves — Sugar Factories established on Modern Lines in India — Some Practical Hints on the Management of Orchards in India — Hæmorrhagic Septicæmia, a serious contagious disease of Cattle — The Dairying Industry in Denmark.	148—170